ESSAYS ON EMPLOYEE COMPENSATION AND CORPORATE FINANCE

by

MARY ELIZABETH THOMPSON

(Under the Direction of Paul Irvine)

ABSTRACT

This dissertation comprises three independent essays that address contemporary issues in corporate finance and employee compensation to understand the role of pensions in corporations as well as the causes and consequences of various pension plan decisions. The first essay explores the decline in Employee Stock Ownership Plan (ESOP) incidence. I identify determinants of ESOP terminations and test the associated hypotheses on a sample of publicly-traded firms from 1992-2007. I find that firms terminate plans because they impose investment risk upon participants and introduce a tension between non-executive and executive equity-based compensation. Additionally, firms with substitute employee ownership plans are more likely to terminate their ESOP. The results highlight the dangers of the unique diversification exemptions associated with ESOPs and suggest a relation between executive compensation and non-executive compensation. In the second essay, I address whether the incentives of top executives influence the type of pension plan offered to non-executive employees. The contribution requirements and relative risk of a firm's pension plans impact its value, and when a firm adopts a defined contribution plan its operating flexibility rises and cash flow variability falls, ultimately increasing firm value. In firms using executive equity pay, pension decisions therefore impact executive wealth, and executives benefit from this action. I examine the link between the two pay types in a sample of publicly-traded firms from 1992-2007 and find that executive compensation does affect a firm's pension choice. The results point to the need to examine the different compensation structures within a firm as interrelated rather than isolated. In the third essay, I examine the origin and development of corporate pension plan provision in the US. I define each pension plan type, explore their characteristics and provide statistics detailing their

incidence. I compare and contrast defined benefit and defined contribution plans and explore the popularity shift from DB to DC plans as well as the more contemporary growth of hybrid plan use. I also explore the trends that shaped pension provision and their drivers as well, and I use the analysis explored in this paper to make predictions about the future of the pension marketplace.

INDEX WORDS: Corporate finance, Employee compensation, Executive compensation, Equity pay, Restricted stock, Option grant, Pension plan, Deferred pay, Defined benefit plan, Defined contribution plan, Employee stock ownership plan (ESOP)

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MARY ELIZABETH THOMPSON

B.S., The University of Alabama, 2006

M.B.A., The University of Alabama, 2008

A Dissertation Submitted to the Graduate Faculty at The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2013

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MARY ELIZABETH THOMPSON

Major Professor:	Paul Irvine
Committee:	Sara Holland Jeffry Netter Annette Poulsen

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2013

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CHAPTER 1

AN EXAMINATION OF THE ABRUPT END OF EMPLOYEE STOCK OWNERSHIP PLANS

1 Introduction

Employee Stock Ownership Plans (ESOPs) are uniquely arranged retirement compensation schemes that require corporations to invest at least 50% of plan assets in employer securities. Legislators endorsed the ESOP structure to increase employee wealth in the form of own-company equity (Kelso and Adler, 1958) and broaden the stock ownership base to include workers (GAO, 1987). They are the only pension plan exempt from diversification requirements. ESOP adoptions peaked during the 1970's and 1980's, but after their use stagnated in the 1990's, plan terminations quickly eclipsed adoptions. In 1992, ESOPs comprised 33% of primary pension plans in public firms. These plans covered 54% of employees participating in primary pension plans and held 82% of the own-company stock held as pension assets. Sixteen years later, ESOPs represented just 26% of primary plans and covered 33% of all participating employees, but held 94% of pension-owned employer stock.

Why did ESOPs become so unpopular in such a limited time? While ESOPs benefit sponsors in a number of ways, they are not without costs, and I test whether these costs drive terminations. First, concentrating participant wealth in own-company stock is a natural consequence of ESOP use, yet this contradicts diversification principles and imposes risk upon participants they cannot adjust. This consequence costs firms and participants alike, since employees discount own-company stock as compensation. Second, in those firms using equity as executive compensation, the presence of an ESOP introduces conflicting incentives caused by non-executive employee ownership. Managers with equity stakes have an incentive to increase firm risk, which is most detrimental to rank-and-file employees participating in an ESOP because these participants are barred from diversifying their pension assets, making both their current and future wealth largely exposed to the firm's idiosyncratic risk.

Previous research has explored the firm's decision to adopt ESOPs but has neglected to examine the decision to terminate a plan. I contribute to the existing literature by examining the decision to terminate an ESOP. I study the determinants of plan terminations over the period of 1992-2008 using a dataset of firm specific and plan level characteristics. My findings support the assertion that ESOP costs motivate firms to terminate their plans. A 1% increase in firm-level idiosyncratic risk increases a firm's probability of ESOP termination by over 8%, and a 1% increase in a plan's exposure to own-company stock increases the likelihood of ESOP termination by nearly 6%. For a $1 million increase in executive equity pay, a firm's likelihood of ESOP termination increases by around 20%. Given the growing weight of equity-based compensation in executive pay, ESOPs compromise a firm's ability to attract and retain important managerial talent. ESOPs are unlikely to disappear completely from public firms, however, as the firms with ESOPs owning a considerable stake in the firm are deterred from terminating them because doing so would compromise a proportion of ownership and control.

This study closely relates to the literature examining equity as compensation. First, the results contribute to understanding the use of employee ownership to mitigate agency costs. The ability of employee ownership to align incentives and reduce agency costs is well established. Yet, a resurgence in an effort to understand and quantify the costs of employee ownership, both for executives and non-executives, highlights the imperfections of aligning pay with performance. This study complements the examination of employee ownership costs, implying that employee-ownership through an ESOP may impose costs that outweigh the benefits. Additionally, because ESOPs contradict the fundamental principle of diversification and because research suggests that use of ESOPs as compensation tools is costly and inefficient,[1] their occurrence is theoretically puzzling. While I do not address this puzzle directly, evidence indicates that firms whose participants could benefit most from diversification efforts are more likely to terminate their ESOPs. Furthermore, robustness tests indicate that the results are driven

[1] For more information, see Meulbroek (2002) or Mitchell and Utkus (2006).

by the sample observations in the period following Enron's collapse.[2] Taken together, this suggests that publicly traded firms reacted to resolve the puzzle somewhat, and implies that firms learned from the wealth destruction that resulted from the notable ESOP failures of the early 2000's.

Additionally, these results contribute to the executive compensation literature by providing evidence of the tension that exists between compensating executives with equity and compensating non-executives with equity. Empirical research has established the impact that managerial stakes have on executive behavior, but previous work ignores that the compensation and incentive structure for one agent or set of agents directly affects the compensation and incentive structure for another agent or set of agents. I demonstrate a connection between pension policy and executive pay methods, and therefore open the door for further analysis of one compensation mode's effect upon another within the firm.[3]

Finally, this study complements the pension plan literature. In examining the costs and benefits of a particular pension plan will not only shed light on the value that firms place on the aspects of these plans, but it will also help as researchers predict likely developments in pension systems and identify opportunities for improving welfare for employees. Pension assets and liabilities represent large fractions of publicly traded firms' net worth, and pension plans are a major mechanism through which firms attract and retain employees. As such, knowledge on the firm's effort to monitor and adjust its pension scheme over time is valuable.

The paper proceeds as follows. Section 1.2 discusses the creation and use of the ESOP, as well as the existing literature on its corporate costs and benefits. Section 1.3 develops hypotheses explaining plan terminations and describes the empirical methods used to test the hypotheses. Section 1.4 details the data

[2]Enron's bankruptcy on December 5, 2011 rendered over $116 million of retirement funds worthless because the firm encouraged employee ownership through an ESOP. WorldCom employees experienced a similar fate mere months after Enron's collapse, and both of these events were very highly publicized.

[3] A recent resurgence in financial literature examining the interdependence between pension plans and overall firm policies underscores the importance of understanding how compensation measures influence firm policy. Frank (2002) shows how a firm's tax benefits are significantly affected by the asset allocation of its pension plans, and Rauh (2006) notes that sizeable pension contributions impose a constraint upon their sponsors, ultimately affecting the firm's investment ability. Stefanescu (2006) uses corporate pension structures to address the theoretical puzzle of sub-optimal leverage use in corporations, finding that accounting for pension contributions on taxable income explains over 30% of the underleverage gap seen in the literature. Most pertinently, Bergstresser, Desai and Rauh (2005) demonstrate how executives adjust pension assumptions in an effort to manage earnings.

and presents summary information. Section 1.5 contains results and interpretation. Section 1.6 concludes the study, and the appendix is in Section 1.7.

2 Literature review

Although ESOPs and ESOP-like vehicles existed in public corporations since 1879, federal statutes did not define them as qualified defined contribution[4] pension plans until Congress passed the Employee Retirement Security Act (ERISA) of 1974 (Friedman, 1983). This legislation created standards that ESOPs adhere to and defined the characteristics that make ESOPs unique. Between 1975 and 1987, ESOPs grew at an exponential rate. The number of ESOPs more than doubled from 1975 to 1986, and just two years later, ESOPs in existence doubled again.[5] After the initial rush to ESOPs by both private and public firms, the total number of ESOPs in existence stagnated, fluctuating from year-to-year between 6,000 and 8,000 plans. By the late 1990's, ESOP terminations increased in staggering rates.[6]

Research has documented the benefits these plans bestow on sponsors. First, in compensating employees with equity, ESOPs align employee incentives with those of shareholders, reducing agency costs and improving firm performance (Conte et al., 1996; Park and Song, 1995; Chang, 1990). Additionally, ESOPs provide their sponsors with tax breaks amounting to as much as 0.3% of firm equity value (Beatty, 1995; Gordon and Pound, 1990)[7] and allow sponsors to substitute cash wages with employer shares to aid in cash conservation efforts (Kim and Ouimet, 2011). Finally, because they place a

[4] All pension plans are either defined benefit plans or defined contribution structures. Defined benefit plans specify future benefits provided to employees participating in the plan, where plan investment policy is controlled by the employer or an employer-appointed trustee, so that the employer bears the risk of investment performance. Common examples of defined benefit plans include flat-benefit formula plans and unit-benefit formula plans. Defined contribution plans specify current contributions where account investment policy is loosely controlled by the employee himself or herself, so that the employee bears the risk of investment performance. Common examples of defined contribution plans include stock-purchase plans, profit-sharing plans, and 401(k)s.

[5] ERISA's passage led to an abundance of plans, and Department of Labor data indicates that 1,601 plans were maintained in 1975 (Murphy, 2005). By 1986, the number of plans more than doubled to 4,174, according to a GAO study. Conte and Lawrence (1992) find that the total number of ESOPs in existence in 1988 equaled 8,543.

[6] From 1979-1985, 15% of ESOPs in the U.S. succumbed to attrition. From 1981-1987, the ESOP attrition rate rose to 30% of all US ESOPs, according the 1987 GAO study. Comparing the attrition rate in these two 6-year period to the fact that nearly one-third of all plans in existence in 1997 were terminated by the end of the year illustrates just how unpopular ESOPs became after their peak in the late 1970's and 1980's (Perun, 2000).

[7] Despite frequent changes to the tax code, ESOP tax breaks arise from three sources: partial deductibility of contributions, ESOP loan interest savings and tax deductibility of dividends paid on ESOP shares. Mitchell and Utkus (2002) estimate that the aggregate tax savings to US firms provided by ESOPs amounted to $1.3 billion in 2002 alone.

non-trivial portion of firm ownership in employee hands, ESOPs insulate firms from potential takeover threats (Beatty, 1995; Rauh, 2006).

ESOPs provide benefits to sponsoring firms, but they also involve costs. ESOP plans must invest predominantly in employer stock counter to ERISA's diversification rule requiring pension plan fiduciaries to diversify plan assets across investment type, geographic areas, business sectors and maturities to reduce the probability of large, correlated losses (Mitchell and Utkus, 2002).[8] ESOPs are the only qualified pension plan exempted from this rule, and diversification barriers in ESOPs render their plan assets more vulnerable to failure than all other retirement plans.[9] The costs of failing to diversify pension assets are large, and may be more severe in recent years than in the past due to sweeping changes in private pensions and an increasingly crippled social security system.[10] Employees invested in single plans within the highest quintile of own-company ownership forgo from 42% to 55% of their wealth due to improper diversification (Meulbroek, 2002; Poterba, 2003), and employees with a diversified plan (in addition to the undiversified portfolio) sacrifice from 25% to 33% of their wealth compared to a well-diversified portfolio. Employees do not bear these costs alone,[11] because to the extent that risk-averse participants bear increased uncertainty, they will demand a risk premium in compensation (Mitchell and Utkus, 2002).[12] Finally, firms can choose from a handful of viable substitute plans that encourage employee ownership without limiting asset diversification.[13] Firms are increasingly using ESOP

[8] Generally, ERISA requires all Defined Benefit plans and most Defined Contribution plans to invest no more than 10% of fund assets in own-company investments, and provides diversification directions based on employee age. Because ESOPs are designed to invest principally in own-company stock, these requirements do not apply to them.

[9] A 2002 study of employee ownership plans by the U.S. GAO reveals that ESOPs held the highest concentrations of own-company shares by far (98%). The second highest concentration (58%) was held in hybrid plans made up of one part ESOP and one part additional plan.

[10] I expand on this assertion in the Appendix.

[11] ESOP participants could mitigate retirement under-diversification by shifting other wealth towards more diversified investments, but studies show that the average employee is subject to loyalty-based investment tendencies (Cohen, 2009; Liang and Weisbenner, 2002) in addition to reduced financial literacy, and both of these effects reduce the chance of outside diversification significantly. Liang and Weisbenner (2002) provides the following example of the rationale behind loyalty-based investing: "participants surveyed by Vanguard view company stock as safer than a diversified portfolio of stocks as well as the stock of any other individual company." Furthermore, studies document that when investors diversify, they adopt naïve approaches (Bernartzi and Thaler, 2001) based solely on the number of investments offered, not on asset types or price co-movement, as diversification principles predict.

[12] Meulbroek (2003) provides an example to illustrate: "to grant an employee stock worth $42,000, the firm must give the employee stock with a market value of $100,000".

[13] Common ESOP alternatives include 401(k) plans with stock provisions, stock option plans, stock bonus plans, profit-sharing plans, money purchase plans with stock provisions and employee stock purchase plans. I define these plans and discuss their characteristics in the Appendix. ESOPs bar diversification efforts, require all eligible employees to participate, do not allow participants to determine how much to invest in the plan, and prevent participants to access funds unless they leave the firm or become fully vested. On the other hand, ESOP alternatives allow for and encourage diversification efforts, allocate discretion if investment levels and plan participation to employees, and grant them access to benefits prior to termination, retirement or death (Perun, 2000).

alternatives as a vehicle for employee-ownership provision, and interest in these plans likely accounts for some ESOP attrition since the early 1990's (Perun, 2000).

ESOPs are costly apart from their diversification implications because they introduce a tension between executive equity compensation and non-executive equity compensation.[14] Non-executive employee-owners prefer to limit firm risk because both their current and future wealth depends on firm value,[15] the ESOP structure's diversification barriers render participants particularly exposed. In contrast, managers pursue risky investments when granted equity-based compensation (Fitzroy and Kraft, 1987; Haugen and Senbet, 1981, Smith and Stulz, 1985, Agrawal and Mendelker, 1987, Tufano, 1996, Rajgopal and Shevlin, 2002, Coles et al., 2003 and Chen et al., 2006), which is most detrimental to non-executive employees whose wealth is largely exposed to idiosyncratic volatility (Bova et al., 2012). In effect, enabling employee ownership to both types of employees creates a conflict of interest.[16] Anecdotal evidence suggests that when non-executive employees control a significant portion of the firm's equity, firms award less equity as compensation to executives,[17] and empirical evidence documents that boards at firms with high non-executive employee ownership are less likely to grant equity-based pay to their CEOs (Zhang, 2011). The tradeoff between non-executive and executive employee ownership suggests that non-managerial employee ownership through an ESOP limits a firm's ability to offer equity as compensation for the most influential employees, and given the increasingly large role that equity-based rewards play in attracting and retaining upper managers, firms who do not offer such compensation are disadvantaged.

[14] The NCEO reports that one role of an ESOP trustee is to monitor whether the ESOP's stock value is negatively affected by executive compensation levels.

[15] Bova et al. (2012) investigates the impact of granting equity-based pay for non executive employees on the risk-taking practices of the firm, finding that granting equity to rank-and-file workers increases both the risk-aversion of these workers as well as their influence on the firm's corporate decision-making. Firms display significantly limited risk-taking actions after making equity grants to non-executives, and this relationship is magnified when the firm's executives also receive equity-based compensation.

[16] According to an NCEO survey of executive compensation in 317 ESOP companies, executive pay remains modest in these firms. While around 75% have cash-based incentive pay, only 15% receive any kind of compensation based on equity. For the period from 1992-2008, less than 15% of public corporations did not provide equity-based compensation to their executives.

[17] In a report based on surveys conducted with thirty companies who completed plan terminations, the NCEO found that five out of thirty firms with recently terminated ESOPs cited the need to obtain equity to compensate key employees factored into the decision to terminate their ESOPs (NCEO, ESOP *Termination Phase I*. April 18, 2007. The article is available online at http://www.nceo.org/assets/pdf/articles/esop_termination.pdf).

3 Hypothesis development and empirical methodology

3.1 ESOP termination regression

Consider a firm that compensates employees with equity through an ESOP. The firm benefits because the ESOP aligns incentives and reduces agency costs, provides protection from unwanted takeover attempts as well as tax breaks, and allows the firm to conserve cash by substituting own-company shares for wages. The firm faces costs due to its ESOP's extreme lack of diversification, which increase with the degree of under-diversification and firm idiosyncratic risk.[18] Therefore, firms with higher idiosyncratic risk and higher proportions of ESOP assets exposed to diversifiable risk will be more likely to terminate their ESOP plans.[19] Finally, the proliferation of alternative types of pension plans encouraging employee ownership without barring participants from undertaking diversification efforts allows firms to take advantage of an ESOP benefit without exposing participants to under-diversification. Accordingly, firms with substitute plans will be more likely to terminate their ESOPs.

ESOPs also introduce a tension between executive equity compensation and non-executive equity compensation because offering equity as compensation both to top managers and to rank-and-file employees causes conflicts of interest. While compensating non-executive employees with equity aligns incentives and encourages mutual monitoring and increased worker performance, it also makes them highly sensitive to the idiosyncratic risk of the firm. Concurrently granting equity to executives induces managerial risk-taking, which is most detrimental to those non-executives receiving equity compensation. Given the rising weight that equity-based pay comprises in executive compensation, the tradeoff will lead firms to substitute one for the other. Thus, I hypothesize that firms with higher executive equity compensation levels will be more likely to terminate ESOPs.

[18] Even and MacPherson (2006), Meulbroek (2005) and Mitchell and Utkus (2002) provide detailed information on this subject.

[19] In a report based on surveys conducted with thirty companies who completed plan terminations, the NCEO found that seven interviewees cited diversification of employee retirement benefits as a concern that led them to terminate their ESOPs (NCEO, ESOP *Termination Phase I*. April 18, 2007. The article is available online at http://www.nceo.org/assets/pdf/articles/esop_termination.pdf).

Firms employ ESOPs to defend takeover attempts because they quickly and effectively place a non-trivial proportion of ownership and control in friendly hands. As firm owners, these employees act in the best interest of the firm, and will block takeover attempts not endorsed by incumbent management. To the extent that maintaining their portion of control benefits these employees and the firm, the firm will be unwilling to cut an ESOP since it compromises the employees' portion of firm control. Therefore, ESOPs that hold larger proportions of the total outstanding equity are essentially entrenchment tools. Based on this notion, firms with ESOPs that hold a smaller ownership stake will be more likely to terminate their plans.

I test the non-competing termination hypotheses using a sample of publicly traded ESOP firms from 1992-2008. The dependent variable of interest is the corporate decision to terminate an existing ESOP. I use a probit approach to model the likelihood that a firm with an ESOP in place will terminate that ESOP. Three categories of variables, namely investment risk, executive equity compensation and plan entrenchment, drive ESOP terminations. The regression specification is

$$Term_{it} = \Phi(\beta' Risk_{it} + \delta ExComp_{it} + \lambda Entrench_{it} + \Gamma' Control_{it} + \theta_t + \varepsilon_{it}) \quad (1)$$

where $Term_{it}$ equals 1 if firm *i* terminates its ESOP in year *t* and 0 otherwise. $Risk_{it}$ is a matrix of firm and plan-level risk variables for firm *i* in year *t*, $ExComp_{it}$ is a variable measuring equity-based executive compensation, $Entrench_{it}$ is a variable measuring plan entrenchment, and $Control_{it}$ is a matrix of firm-level tax, incentive alignment, takeover interest and financial control variables. θ_t is a year fixed effect and ε_{it} is an error term. Since this regression represents the decision to terminate an ESOP, and only firms with ESOPs in place may make this decision, the methodology involves contrasting the terminating firms against the control firms who have not chosen to terminate their ESOPs. Additionally, a firm's plan appears in the sample until termination, at which point the plan ceases to exist and plan-specific information ceases to be available. As such, terminations are not repeatable. Specific details and calculation descriptions of variables of interest appear in the Appendix.

3.2 Endogeneity of executive equity compensation

I propose that a firm's executive equity compensation choice influences its decision to terminate an ESOP, but it is possible that firms consider these two compensation decisions simultaneously,[20] or that firms terminate ESOPs and then increase equity compensation for executives. I account for endogeneity using instrumental variable analysis. Potential instruments which affect the executive compensation scheme of a firm but do not factor into the decision to terminate an ESOP include average executive tenure, average executive age, executive perquisites, industry market concentration and earnings management activity. I use executive age and tenure to identify the effect that executive equity compensation has on a firm's ESOP termination decision, which may be masked in regressions not accounting for endogeneity.[21] I also use the Herfindahl-Hirschman Index, which measures market concentration, as an industry-level instrument in addition to the firm-level instruments.

Because the dependent variable is limited and the data is longitudinal, the ideal specification models the termination decision as an instrumental variables probit regression with time fixed effects. The first stage involves a regression on the continuous endogenous variable, executive equity-based awards, using all exogenous and instrumental variables. The second stage involves a probit regression with the predicted executive equity-based awards and the exogenous variables.

[20] The Board of Directors is charged with approval of both of these decisions, and given that boards meet very few times per year, the likelihood that these issues are discussed and decided on simultaneously is high (Zhang, 2011).

[21] Various executive traits play a role in determining their compensation structures (Fernandes, Ferreria, Matos and Murphy, 2009), and of these, executive risk-aversion is unlikely to influence pension choice. In the basic principal-agent model, an executive's optimal level of incentive-based pay declines as risk-aversion increases. Smith and Watts (1982) documents that executives become more risk-averse as they approach retirement, a phenomenon commonly referred to as the "horizon problem". The horizon problem occurs when a firm's investment horizon exceeds executive tenure, which leads a myopic manager to exchange current benefits at the cost of future profits, knowing that they will no longer be with the firm by the time their action's costs are realized (Smith and Watts, 1982; DeChow and Sloan, 1991; Cheng, 2004). Pay to performance contracts with vesting periods mitigate the horizon problem since it arises from timing differences between managerial actions and compensation rewards or punishment. DeChow and Sloan (1991) confirms the existence of the horizon problem with respect to R&D spending, and shows that firms mitigate such myopic behavior with stock and option grants. I use CEO tenure and the averaged tenure of top executives to proxy for risk-aversion in unreported regressions to ensure robustness. Gibbons and Murphy (1992) finds evidence that the pay-for-performance sensitivity of an executive is positively related to their tenure, and Graham, Harvey and Puri (2010) documents that more risk-averse CEOs are less likely to receive performance-based pay using a novel measure of manager risk-aversion based on results from executive psychometric tests. Hill and Phan (1991) and Agrawal and Knoeber (1996) also find that longer-tenured executives are driven by risk-aversion to prefer less equity compensation and more cash, citing the fact that executives with longer tenures are more likely to hold substantial equity shares from previous equity grants.

3.3 Construction of variables

I use three measures to capture the effects of investment risk on ESOP termination. First, I use a dummy variable to indicate the existence of an alternative employee-ownership plan if a firm sponsors any of the following four ESOP alternatives in the year prior to the observation year: 401(k) with employer stock provision, employee stock purchase plan, stock bonus plan, or money benefit plan with stock provision. Second, I use one plus the natural log of the firm's unsystematic risk[22] from the year prior to the observation year, which directly measures firm-specific variability otherwise eliminated by proper diversification, to capture the cost the ESOP imposes on participants. I use the natural logarithm of one plus the percentage of plan assets invested in own-company stock, calculated as the market value of own-company equity held as pension assets divided by the total value of plan assets, as a measure of the degree that plan assets are exposed to idiosyncratic risk. Given that prior research indicates that larger discounts in value result from larger proportions of undiversified wealth, I expect to observe a positive effect on the substitute dummy, pension percent and unsystematic risk in the termination regressions. I calculate the market value of employer shares held as pension assets scaled by the total equity value of the firm as a measure of plan entrenchment since it represents the proportion of the firm that the ESOP holds and thus controls. I add this percentage to one and transform it using the natural logarithm function, and I expect it to negatively affect ESOP terminations.

I measure executive equity-based pay as the sum of the value of new restricted stock grants plus the sum of the value of new option grants awarded to the five highest-ranking executives of a firm. I expect the effect of executive equity compensation on ESOP termination to be positive. In the instrumental variables framework, average executive age and average executive tenure serve as instruments. I construct average executive age as the averaged age in years of the top five ranking executive employees of the firm. Average executive tenure is the averaged length of time in years that the top five ranking executives have been with the firm. The Hirfindahl-Hirschman Index is an industry-level

[22] I decompose idiosyncratic risk from total risk, which I calculate using a value-weighted market model where the beta is estimated two years prior to the observation year.

variable, and I calculate it as the sum of the squared market share of each firm in a particular industry as denoted by the primary two digits of the Standard Industrial Classification code.

I control for the standard drivers of ESOP adoptions based on the systematically established ESOP benefits, since they likely influence terminations as well.[23] I include two variables to control for the incentive alignment aspect of ESOPs. I calculate free-cash flow based on the method in Lehn and Poulsen (1989) and scale it by total assets as a proxy for agency cost. I use sales per employee to measure the importance of employee effort on productivity, since incentive-alignment efforts work best when employees believe that their actions readily impact firm performance and profitability. I use the firm's marginal tax from the Graham (1996) database to proxy for a firm's tax liabilities, because ESOPs provide tax benefits to sponsoring firms. A dummy variable indicating takeover activity controls for the anti-takeover aspect of ESOPs. This dummy takes a value of one if the firm received a takeover attempt in the observation year, regardless of whether the interest was hostile and whether the deal was completed. I include liquidity since ESOPs allow cash-constrained firms to substitute equity compensation for cash compensation and calculate it as total working capital scaled by the book value of assets. I include debt-to-equity in the specification as a proxy for leverage, since ESOPs may be used to obtain capital at a low cost. I control for the firm's size using the natural logarithm of total assets. Tobin's-q, calculated based on the method in Lang and Stulz (1994), measures firm performance based on productivity. I compute return on assets (ROA) by dividing net income by total assets and use this as an alternative to Tobin's-q. Table 1.2 provides a summary of the hypotheses I examine in regards to ESOP terminations along with their corresponding marginal effect predictions. I also provide information about the variables of interest and relevant proxies associated with the hypotheses.

[23] Because these factors motivate firms to adopt ESOPs, it is possible that they factor into termination decisions. However, the likelihood that these adoption motivations apply symmetrically to terminations is quite low. Logically, the incentive alignment and tax-advantage hypotheses predict that firms will adopt ESOPs to reduce agency costs by aligning incentives and reduce tax liabilities. By symmetry, they would apply to terminations by predicting that firms terminate ESOPs to increase agency costs and increase tax liabilities. This contradicts the public firm's goal of value maximization. Symmetrically applying the takeover defense hypothesis to terminations implies that firms terminate ESOPs to increase their probability of takeover. This is more believable than the previous hypotheses because some firms may desire to be acquired. However, eliminating an ESOP is unnecessary in the event of a welcomed takeover attempt, because management can simply instruct the ESOP voters or ESOP trustee to approve the takeover attempt to nullify the takeover defense aspect of the ESOP. In essence, ESOPs are not automatic takeover defenses.

4 Data

4.1 Sample selection

I construct the dataset from two primary sources. First, I obtain firm-level pension plan information provided on the IRS Form 5500 for years 1992-2008 from two sources: the Department of Labor website[24] and Boston College's Center for Retirement Research (CRR) Data Enclave website[25]. Each firm offering any form of pension, welfare or fringe benefit plan to its employees provides timely information to the Internal Revenue Service in a multi-schedule filing called a Form 5500. Specifically, firms complete as many as ten applicable schedules to provide details about plan design and history, participation and registration information, funding and contribution amounts, and financial and actuarial transactions.[26] I focus only on primary Form 5500 filings with pension plan information, deleting all filings related only to fringe benefit plans or welfare plans. I also restrict my examination to single-employer plans and plans not part of a collective trust, because using multi-employer and collective plans would distort results.[27]

I construct the sample by matching Form 5500 pension data to firm-level accounting data from Compustat's annually updated information database for the period from 1992 to 2008. In the subsample for the years 1992-1998, pension data is easily matched to CUSIP data through the firm's unique CUSIP number. For all data post-1998, the only consistent firm identifier provided in the pension data is the Employer Identification Number (EIN), given to a firm by the Internal Revenue Service at incorporation. Table 2 provides an illustration of sample terminations, and I provide the total number of public ESOPs along with the total number of ESOP adoptions by public firm each year for comparison purposes.

[24] Url: http://www.dol.gov/ebsa/foia/foia-5500.html
[25] Url:http://crr.bc.edu/frequently_requested_data/data_and_documentation.html
[26] While all firms with 100 or more employees are required to file a Form 5500 every year, smaller firms must only file once every two years. Conceivably, this could result in a sample in which small firms are underrepresented, but because the focus of my study is restricted to publicly traded firms, this problem is less alarming.
[27] Multi-employer plans are maintained by a collection of sponsors and organized into common or master trusts. It is difficult to attribute plan-specific information or decision-making power to any of the firms in the collection of firms. Since the empirical specification involves a firm-level decision as the outcome variable, multi-employer plans would complicate the empirical specification. Excluding multi-employer plans eliminates less than 50 plans per observation year.

I employ a number of additional sources to obtain other relevant data. I use stock price data from the Center for Research on Security Prices (CRSP), public firm takeover incidence from Thomson-Reuters' SDC Platinum database, and executive characteristics from Compustat's Execucomp database. The combined Form 5500 and Compustat data set consists of 20,154 firm-years. Restricting the sample to ESOPs leaves 5,276 firm-year observations for 791 unique firms. In the entire Form 5500 and Compustat data set, there are 443 ESOP terminations. I exclude plans that list multiple termination years, plans in newly acquired firms, and plans with missing data. This results in 366 ESOP terminations, and the unconditional probability of termination for the period from 1992 to 2008 is 7%. The shortest a single public firm ESOP exists in the sample is 3 years, and the longest a single public firm exists in the sample is 16 years. On average, the length of time that a public firm appears in the sample is 7 years.

4.2 Univariate descriptive statistics

Table 1.3 contains results from differences in means tests performed on explanatory, control and miscellaneous descriptive variables for ESOP-terminating firms and non-terminating firms. Terminating firms are larger, more highly leveraged and less productive than their counterparts are. They also face lower marginal tax rates than non-terminating ESOP firms. Terminating firms have higher firm-specific risk, higher plan exposure to this risk, and more substitutes, on average, than non-terminating firms. Additionally, the average firm interest owned by ESOPs is much smaller in terminating firms than in non-terminating firms. Finally, it appears that firms that terminate offer less equity as executive compensation, but a T-test for equal means does not distinguish between the two levels of equity-based executive pay, on average.

Compared to the Compustat universe of firms during the sample period, sample firms are larger in terms of total assets and number of employees. Compustat firms performed slightly better than sample firms, as measured by both Tobin's-q and ROA, but the differences were very small. Sample firms appear to have larger amounts of debt and outstanding equity than those in the Compustat universe, on average,

although the market price of firms in the Compustat universe is significantly larger than that of the sample firms. Sample firms are less risky, measured by both idiosyncratic and total risk, but they do provide larger amounts of equity-based executive compensation, on average, than the universe of Compustat firms.

5 Determinants of ESOP terminations

5.1 Simple estimates

Table 1.4 provides results from the probit regression of ESOP termination on the independent firm and plan characteristics. The first specification includes only the explanatory variables related to the hypotheses, absent firm controls. In this model, all of the variables of interest are significant, and the signs of all but one of the variables conform to the predicted signs according to the hypotheses. The coefficient on executive equity compensation is negative, and it is likely that omitting control variables causes this regressor to pick up some relevant effects related to control variables that it would not when controls are included. According to the marginal effects estimates for the risk-related variables, a 1% increase in unsystematic risk and pension exposure increases the likelihood of ESOP termination by nearly 2% and nearly 6%, respectively, while the presence of a substitute plan in a firm's pension offering increases the likelihood of ESOP termination by over 2%. The second specification includes control variables, but omits the variables of interest pertaining to the hypotheses. This model correctly predicts the smallest percentage of terminations and the relatively small Chi-squared statistic indicates that this model provides the worst termination decision fit of all the models. The third specification includes only the entrenchment and control variables, but omits other explanatory variables of interest. Again, the results show decreased explanatory power relative to model 1. The plan entrenchment marginal effect is significant, and according to the estimate, a small increase in an ESOP's ownership interest decreases the firm's probability of ESOP termination by nearly one hundred percent. The fourth model contains only the risk-related explanatory variables and control variables. According to the marginal effects, a 1% increase in firm idiosyncratic risk increases the firm's ESOP termination probability by over 1%, while

the presence of a substitute plan translates into an increase in the likelihood of ESOP termination of almost one percent. The final regression includes all of the control variables along with the hypothesis-driven variables, and this model correctly predicts the highest number of terminations. All of the risk-related variables are significant and confirm the hypotheses. The economic interpretation of these marginal effects suggests that the probability of ESOP termination is marginally sensitive to these investment risk metrics. For a marginal increase in firm-specific risk and pension exposure, the likelihood of plan termination rises by over one percent and five percent, respectively, and firms with ESOP substitutes are over two percent more likely to terminate their plans than those without. The plan entrenchment marginal effect, which is negative and significant, indicates that a small increase in an ESOP's portion of control decreases a firm's termination likelihood by over ninety percent. Finally, the executive compensation marginal effect is insignificant, signifying that executive equity-based executive pay does not significantly affect pension choice. Based on these preliminary results, it appears that there is strong support for the investment risk and entrenchment hypotheses, and very little support for the executive equity compensation hypothesis.

5.2 Conditional estimates

Table 1.5 contains results from logistic regressions that incorporate time fixed effects. To the extent that unobservable or unmeasured time-variant factors influence firms' decision to terminate their ESOPs, time fixed effects address this concern. In the first specification, I include hypothesis-driven variables and omit control variables. The risk-related marginal effects are all significant and in accordance with the predictions, as is the marginal effect on plan entrenchment. Executive equity based pay is significant, but the direction of the relationship may be influenced by the absence of control variables. In the second model, I include control variables and executive equity compensation and omit the other variables. Again, the fit statistics imply that the omitted variables are important. The third model contains only the entrenchment explanatory variable and the control variables, and the fourth model includes only risk-related variables and control variables. The final specification includes all relevant

variables, and this model predicts the highest outcomes correctly and exhibits the highest model Wald Chi-squared value, indicating that it provides the best fit of the models. All of the risk-related variables are significant, and all conform to the hypothetical predictions. According to the marginal effects estimates, a 1% increase in unsystematic risk renders a firm 8.1% more likely to terminate its ESOP, and a 1% increase in the exposure of pension assets to own-company stock renders a firm 5.4% more likely to terminate its ESOP. Similarly, if a firm adopts a substitute employee ownership plan, their probability of termination rises by more than 2%. Executive equity does not appear to factor significantly into the ESOP termination decision, but plan entrenchment does to a large degree. Interpreting the effect of plan entrenchment reveals that a miniscule increase in firm control held by the ESOP decreases the probability of termination by around ninety percent.

5.3 Conditional estimates after addressing for endogeneity-bias

Table 1.6 contains the regression results from instrumental variables probit models, and I present both the results from the first stage regressions and the results from the second stage regressions. The first stage performs OLS regression on the endogeneous variable, using all exogenous variables and instruments as regressors. I use average executive tenure, average executive age and a proxy for market concentration as instruments. The second stages contain the primary results of interest. Column 1 presents results using executive age as the instrument, and two out of three of the risk-related variables are significant and in accordance with the predictions. A 1% increase in idiosyncratic risk and plan exposure decreases a firm's termination probability by over 6% and 11%, respectively, while a 1% increase in plan entrenchment renders a firm nearly 80% less likely to terminate their ESOP. Executive pay exhibits the strongest influence on termination, however, as a $1 million increase in managerial equity-based compensation increases a firm's likelihood of termination by nearly 20%. All of the signs on these coefficients match the theoretical predictions, including executive equity compensation. Column 2 presents similar results employing average executive tenure as the instrument. Again, the significant risk variables conform to the predictions, and the magnitudes of the marginal effects are similar to the results

in Column 1. Column 3 presents the marginal effects of explanatory variables and controls on the ESOP termination decision, with market concentration as the instrument. In this specification, only the risk-related and entrenchment variables are significant. While the significance of executive equity-based pay in Columns 1 and 2 indicates that firms do trade off broad employee ownership with executive ownership, the absence of this effect in Column 3 leads me to interpret the previous columns' results with caution for two reasons. First, market concentration is the strongest of the three instruments. Additionally, the third specification correctly predicts the most outcomes. I plan to address these concerns to more fully understand the relationship between executive compensation and pension choice by seeking better instruments and trying additional measures of equity compensation.

Because of the enduring importance of the risk-related variables and their conformance to the hypothesized predictions, I interpret these results as strong evidence that firm are driven, in part, by diversification concerns to terminate ESOPs. Plans that place a higher degree of firm control in employee hands face a reduced termination probability, and this effect is prevalent and consistently significant throughout the analyses, indicating that firms value the takeover impediment aspect of the ESOP structure. After controlling for endogeneity, moderate evidence of a tradeoff between executive and non-executive equity compensation grants appears, and this tradeoff leads firms to terminate their plans, as firms with higher values of managerial equity-based pay grants are more likely to terminate their ESOPs.[28]

Taken as a whole, the results of the termination regressions strongly confirm the investment risk and entrenchment hypotheses and moderately support the executive equity compensation hypothesis. Thus, it appears that both the costly overconcentration aspects of these plans and the tradeoff between granting equity to executives and granting equity to non-executives drive ESOP terminations. The larger

[28]I conduct additional tests to ensure that these results are robust. First, I perform the aforementioned regressions on a restricted sample of stand-alone ESOPs (non-hybrid plans) to mitigate the concern that my tests are free from any influence caused by any non-ESOP aspects of these plans. Even though this results in a smaller sample size (stand-alone ESOPs comprise around 60% of the entire ESOP sample) which lessens the power of the tests, the conclusions are largely unchanged. I also include either lagged raw return or averaged daily abnormal return for the five years prior to the observation year in the specifications to address the potential that a firm's recent stock price performance drives ESOP terminations. Again, the results are unchanged, and the coefficients on these additional variables are insignificant.

the portion of the firm an ESOP holds, however, the more vulnerable the firm would be to a shift in control in the event of a plan termination, so plan entrenchment strongly deters termination.

I conjecture that a weakening social security system and changes in the private pension marketplace have increased the costs of improper diversification of retirement assets through an ESOP since the late eighties and early nineties, but it is hard to pinpoint a "tipping point" year enabling me to test this assertion. I can test the claim that firms became more aware of the extreme costs of ESOPs due to improper diversification by examining two subsamples created based on the Enron failure.[29] The first subsample is comprised of firm filings prior to the 2001 Enron ESOP failure, and the second consists of those filings from the post-Enron period. I re-run the simple probit and conditional probit regressions on each of the subsamples to examine whether the ESOP termination decision became more or less sensitive to the idiosyncratic risk factors after the most highly-publicized ESOP failure. If firms became more acutely aware of the costs of providing own-company stock as pension assets after Enron, I expect the marginal effects loadings on the risk-related variables to be higher in magnitude for subsample 2 than for subsample 1. Both the simple probit results in Columns 1 and 3 and the conditional probit results in Columns 2 and 4 confirm that firm-specific risk and plan exposure played a larger role in the post-Enron period. Indeed, Columns 1 and 2 imply that idiosyncratic risk and plan exposure did not matter at all in the period prior to Enron's collapse. This evidence suggests that firms "learned" from the spectacular failure of Enron's ESOP and the resulting negative wealth effects that it had on the ESOP's participants.

6 Conclusion

ESOPs commonly occupied a part of the typical public firm's pension scheme after the 1974 passage of ERISA, which solidified their status as a legitimate retirements benefit plan and employee ownership vehicle. For nearly twenty years, firms established ESOPs because of their tax-advantaged status, incentive alignment ability, and takeover defense ability. In the mid-nineties, however, the

[29] At the time Enron declared bankruptcy in December of 2001, 58% of Enron employees' defined contribution assets were invested in own-company stock. Immediately after the bankruptcy, Enron's stock price fell 99% in value. A number of employees lost up to 99% of their retirement accounts, and nearly $116 million of ESOP assets became worthless overnight (Maggs, 2003).

popularity of the ESOP stagnated, and ESOP terminations soon eclipsed adoptions. Owing the decline of the ESOP structure to the potential downsides of the plan, I investigate the determinants of plan terminations in public corporations. ESOPs expose participants to diversifiable risk they are barred from adjusting, which contradicts diversification principles and imposes costs to participants and firms alike. ESOPs also introduce a tradeoff between using equity as managerial pay and using equity as compensation for rank-and-file workers. These downsides, namely the plan's costly barriers to diversification and tension the plan introduces between equity-based compensation for executives, have likely become more costly for public firms in recent years.

I find strong and enduring evidence of the detrimental effects of the plan's barriers to diversification, as the probability of ESOP termination rises with increases in idiosyncratic risk and plan exposure. An examination of the effect of adopting substitute plans, which encourage employee ownership yet allow for diversification efforts, reveals that firms with a substitute plan face a higher likelihood of plan termination. I address endogeneity and find evidence of a tradeoff between offering executives equity-based pay and offering non-executives employee ownership opportunities. The conflict of interest that arises when equity is granted as compensation to both of these groups of employees results from differing incentive effects. Managers are induced by equity grants to pursue risky projects or investments, which is most detrimental to rank-and-file employees with both current and future income largely exposed to their employer's idiosyncratic risk. Firms in the U.S. are not likely to abandon the ESOP structure altogether, however. The ESOP structure's ability to place a portion of firm control in the friendly hands of employees is an enduring benefit of these plans, and as the ownership stake controlled by plans increases, the probability of plan termination decreases drastically.

This study contributes to the employee compensation, pension plan choice, and agency cost literature, but many questions stem from these conclusions. Because ESOPs literally block diversification efforts, they are likely to impose higher costs of diversification on plan participants. How much more costly is offering employee ownership through an ESOP relative to offering employee ownership through

a 401(k) or other substitute plan? ESOPs are the only type of retirement plan exempted from stringent and thorough diversification requirements. Is this exemption unwarranted? Finally, the tradeoff between executive equity compensation and broad-based employee ownership is somewhat unexplored. This research avenue could prove especially fruitful given the changing pension and executive compensation environments of late.

Table 1.1 - Public ESOP Incidence, Adoptions and Terminations

This table presents the annual number of ESOPs in existence (second column), new ESOPs adopted (third column) and ESOPs terminated (fifth column) by publicly-traded firms from 1992-2008. The fourth and sixth columns show new ESOPs and terminated ESOPs as a percentage of ESOPs in existence. These statistics were compiled based on Form 5500 data made public by the Department of Labor, and publicly-traded firms were determined using IRS employer identification numbers.

Year	Total Public ESOPs	New Plans Adopted	% of Total ESOPs	Plans in Place Terminated	% of Total ESOPs
1992	332	23	6.93%	25	7.53%
1993	331	12	3.63%	21	6.34%
1994	307	11	3.58%	19	6.19%
1995	294	18	6.12%	27	9.18%
1996	280	11	3.93%	16	5.71%
1997	270	11	4.07%	20	7.41%
1998	232	16	6.90%	14	6.03%
1999	251	6	2.39%	16	6.37%
2000	294	10	3.40%	26	8.84%
2001	318	5	1.57%	37	11.64%
2002	343	4	1.17%	28	8.16%
2003	348	0	0.00%	23	6.61%
2004	348	2	0.57%	27	7.76%
2005	349	2	0.57%	20	5.73%
2006	341	3	0.88%	17	4.99%
2007	330	6	1.82%	16	4.85%
2008	307	0	0.00%	14	4.56%
Total	5275	140		366	

Table 1.2: Summary of Hypotheses, Corresponding Variables and Predicted Relationship Direction

This table summarizes the three causes of ESOP termination and predicts their relative influences. The first column contains the hypothesized determinants that drive ESOP terminations. The second column lists the variables of interest and the third column details the proxies for these variables. The final column predicts the determinants' effects on the probability of ESOP termination.

Hypothesis description	Variables	Proxy	Predicted Sign
Investment Risk - Firms terminate ESOPs because they expose participants to costly diversifiable risk	1. Firm-specific risk	Unsystematic risk (decomposed from market model)	(+)
	2. Degree of exposure	% of plan assets invested in employer stock	(+)
	3. Substitute plans	Indicator variable equal to one if the firm has a substitute plan in the previous year	(+)
Entrenchment - Firms terminate less entrenched plans because they don't compromise firm control	1. Plan entrenchment	% of firm market capitalization held as pension assets	(-)
Executive Equity Compensation - Firms terminate ESOPs to free up equity with which to compensate executives	1. Total executive compensation based on equity	Dollar value of restricted equity grants plus option grants per year granted to the top executives of the firm	(+)

Table 1.3 (Panel A) - Univariate Descriptive Statistics

This table presents results from a comparison of mean values for the sample of ESOP non-terminating firms and terminating firms and for firms in the Compustat, Execucomp and Form 5500 pension plan database. Panel A presents the means for explanatory variables and instrumental variables and Panel B presents the means for a collection of miscellaneous descriptive variables. The universe of firms in Panel A consists of those publicly-traded firms appearing in the Compustat database for the firm-level variables and the Compustat Execucomp database for the executive compensation and instrumental variables. The universe of firms is made up of publicly-traded firms that file a form 5500 in any observation year. Any firm that appears in Thomson's SDC database is in the universe of firms for the takeover variable. In Panel B, the universe of firms is comprised of any firms that file a form 5500 in any observation year for the pension variables and the universe of firms is comprised of firms appearing in Compustat's database for the firm-level variables. All dollar values are adjusted for inflation and appear in 2008 dollars.

Panel A - Explanatory Variables of Interest, Instrumental Variables and Control Variables Plan Descriptive Statistics

Characteristic	(N)	Universe of firms	(N)	ESOP terminating firms	(N)	Non-ESOP terminating firms
Explanatory Variables of Interest and Instrumental Variables						
Unsystematic risk (%)	14,414	26.43	351	17.56	4,812	13.33
Pension percent (%)	14,626	6.55	361	57.26	4,870	50.02
Substitute plan dummy			366	70.49	4,910	51.96
Entrenchment (%)	14,649	0.61	362	0.89	4,879	4.50
Avg executive equity pay ($)	31,908	6,080	252	7,853	3,638	10,066
Average executive tenure	24,379	10.81	176	11.93	2,799	14.27
Average executive age	21,019	61.27	253	60.86	3,678	61.27
Control Variables						
Takeover interest dummy	28,956	0.08	366	0.12	4,910	0.08
Size ($)	32,120	11,797	366	16,523	4,910	25,654
Free-cash-flow ratio	14,878	0.09	366	0.09	4,910	0.10
Tobin's-Q	14,867	1.36	366	0.97	4,906	1.14
Sales per employee ($)	30,545	441,332	363	1,603,471	4,904	223,486
Debt-to-equity ratio	14,851	1.59	366	45.14	4,903	37.49
Marginal tax rate (%)	32,115	30.40	366	31.40	4,907	32.52

Table 1.3 (Panel B) - Univariate Descriptive Statistics

This table presents results from a comparison of mean values for the sample of ESOP non-terminating firms and terminating firms and for firms in the Compustat, Execucomp and Form 5500 pension plan database. Panel A presents the means for explanatory variables and instrumental variables and Panel B presents the means for a collection of miscellaneous descriptive variables. The universe of firms in Panel A consists of those publicly-traded firms appearing in the Compustat database for the firm-level variables and the Compustat Execucomp database for the executive compensation and instrumental variables. The universe of firms is made up of publicly-traded firms that file a form 5500 in any observation year. Any firm that appears in Thomson's SDC database is in the universe of firms for the takeover variable. In Panel B, the universe of firms is comprised of any firms that file a form 5500 in any observation year for the pension variables and the universe of firms is comprised of firms appearing in Compustat's database for the firm-level variables. All dollar values are adjusted for inflation and appear in 2008 dollars.

Panel B - Other Firm and Plan Descriptive Statistics

Characteristic	(N)	Universe of firms	(N)	ESOP terminating firms	(N)	Non-ESOP terminating firms
Miscellaneous Variables						
Market price ($)	32,018	72.70	366	26.71	4,908	34.60
Earnings per share ($)	32,051	3.49	366	1.40	4,910	2.31
Equity beta	32,156	0.67	361	0.75	4,904	0.78
Ann. st. dev. of returns (%)	32,154	45.89	366	36.97	4,910	32.86
Employees	31,239	14.64	360	17.75	4,834	27.50
Pension Plan variables						
Leveraged ESOP dummy			366	0.54	4,908	0.60
Stand alone ESOP dummy			366	0.81	4,910	0.44
Active participants	14,878	3,500	366	1,151	4,910	11,327
Plan age	13,662	22	365	17	4,905	22
Own-co. stock held as pension assets ($)	14,667	14,350,315	366	117,875,946	4,910	337,410,000
Employer contributions ($)	13,696	2,052,123	366	134,554	4,910	3,945,372
Participant contributions ($)	13,696	215,965	366	45,595	4,910	532,174
Total contributions ($)	14,725	10,254,102	366	7,714,290	4,910	50,770,259
Funds distributed as benefits ($)	13,696	14,527,040	366	13,709,973	4,910	80,302,365
Total assets ($)	14,667	195,479,503	366	76,017,072	4,910	1,022,000,000
Total liabilities ($)	14,725	5,096,744	366	10,322,010	4,910	39,404,612

Table 1.4 - Determinants of Employee Stock Ownership Plan Terminations

This table displays results from probit regressions of the corporate decision to terminate an Employee Stock Ownership Plan on explanatory variables. The variables of interest represent the investment risk, executive compensation and plan entrenchment measures that drive ESOP terminations. The instruments used are CEO age, squared value of CEO age, averaged top executive age and averaged top executive tenure. The sample period spans from 1992 - 2008, and is limited to publicly-traded firms. Marginal effects are presented below, and their corresponding p-values are listed in parentheses right under them. Statistical significance at the 0.1, 0.05 and 0.01 level is denoted by (*), (**) and (***), respectively. Results are obtained via Maximum Likelihood Estimation.

Model	(1)		(2)		(3)		(4)		(5)	
Unsystematic Risk	0.016	***					0.011	**	0.014	***
	(0.001)						(0.012)		(0.009)	
Pension %	0.056	***					0.006		0.052	***
	(0.000)						(0.514)		(0.000)	
Substitute plans	0.022	**					0.045	***	0.023	***
	(0.011)						(0.000)		(0.008)	
Entrenchment	-0.985	***			-0.636	***			-0.912	***
	(0.000)				(0.000)				(0.000)	
Exec. Equity	-0.009	***	0.001						-0.002	
	(0.001)		(0.841)						(0.625)	
Firm size			-0.009	**	-0.010	***	-0.002		-0.008	**
			(0.013)		(0.000)		(0.408)		(0.040)	
ROA			-0.018	**	-0.025	***	-0.020	***	-0.020	**
			(0.029)		(0.000)		(0.004)		(0.010)	
Liquidity			-0.046		-0.002		-0.035		-0.049	
			(0.187)		(0.927)		(0.162)		(0.153)	
Leverage			0.011	**	0.007	**	0.004		0.007	*
			(0.017)		(0.027)		(0.239)		(0.099)	
FCF Ratio			-0.004		0.021		0.032		-0.022	
			(0.954)		(0.650)		(0.531)		(0.727)	
Sales/Employee			-0.004		-0.004		-0.004		-0.004	
			(0.249)		(0.170)		(0.263)		(0.233)	
Marginal tax rate			-0.025		-0.042		0.010		0.013	
			(0.445)		(0.124)		(0.745)		(0.684)	
Takeover interest			0.024	*	0.022	*	0.026	**	0.024	*
			(0.066)		(0.056)		(0.024)		(0.054)	
Chi-Squared	298.03		41.84		281.13		87.62		306.05	
Correctly predicted	93.66%		91.02%		93.23%		93.37%		93.69%	
Pseudo R-squared	17.02%		2.53%		11.81%		3.60%		18.73%	
Outcomes = 1	222		222		345		331		219	
Outcomes = 0	3,265		3,281		4,751		4,665		3,470	
# Obs	3,487		3,503		5,096		4,996		3,689	

Table 1.5 - Determinants of Employee Stock Ownership Plan Terminations

This table displays results from probit regressions with time fixed effects of the corporate decision to terminate an Employee Stock Ownership Plan on various explanatory variables. The variables of interest represent the investment risk, executive compensation and plan entrenchment measures that drive ESOP terminations. The sample period spans from 1992 - 2008, and is limited to publicly-traded firms. Marginal effects are presented below, and their corresponding p-values are listed in parentheses right under them. Statistical significance at the 0.1, 0.05 and 0.01 level is denoted by (*), (**) and (***), respectively. Results are obtained via Maximum Likelihood Estimation.

Model	(1)		(2)		(3)		(4)		(5)	
Unsystematic Risk	0.092	***					0.006		0.081	***
	(0.002)						(0.195)		(0.008)	
Pension %	0.057	***					0.005		0.054	***
	(0.000)						(0.578)		(0.000)	
Substitute plans	0.023	***					0.045	***	0.022	***
	(0.008)						(0.000)		(0.009)	
Entrenchment	-0.996	***			-0.599	***			-0.901	***
	(0.000)				(0.000)				(0.000)	
Exec. Equity	-0.011	***	0.001						-0.003	
	(0.000)		(0.899)						(0.442)	
Firm size			-0.009	**	-0.010	***	-0.003		-0.009	**
			(0.017)		(0.000)		(0.213)		(0.015)	
ROA			-0.018	**	-0.025	***	-0.019	***	-0.021	***
			(0.028)		(0.000)		(0.005)		(0.006)	
Liquidity			-0.040		0.001		-0.032		-0.039	
			(0.252)		(0.961)		(0.198)		(0.261)	
Leverage			0.011	**	0.006	*	0.005		0.007	*
			(0.023)		(0.054)		(0.185)		(0.111)	
FCF Ratio			-0.011		0.021		0.025		-0.019	
			(0.860)		(0.648)		(0.625)		(0.762)	
Sales/Employee			-0.004		-0.005		-0.004		-0.006	*
			(0.329)		(0.142)		(0.251)		(0.090)	
Marginal tax rate			-0.024		-0.032		0.008		0.017	
			(0.470)		(0.247)		(0.776)		(0.596)	
Takeover interest			0.030	**	0.033	***	0.033	***	0.034	**
			(0.032)		(0.005)		(0.007)		(0.011)	
Chi-Squared	304.75		61.57		331.08		101.38		333.55	
Correctly predicted	93.69%		93.66%		93.23%		93.37%		93.78%	
Pseudo R-squared	18.44%		3.72%		13.21%		4.16%		20.41%	
Outcomes = 1	222		222		345		331		219	
Outcomes = 0	3,265		3,281		4,751		4,665		3,470	
# Obs	3,487		3,503		5,096		4,996		3,689	

Table 1.6 - Determinants of Employee Stock Ownership Plan Terminations after Addressing Endogeneity-bias

This table displays results from instrumental variable probit regressions of the corporate decision to terminate an Employee Stock Ownership Plan on explanatory variables. The variables of interest represent the investment risk, executive compensation and plan entrenchment measures that drive ESOP terminations. Averaged top executive age, averaged top executive tenure and Hirfindahl-Hirschman Index instrument for executive compensation, the endogenous explanatory variable. The sample period spans from 1992 - 2007 and is limited to publicly-traded firms. Marginal effects are presented below, and their corresponding p-values are listed in parentheses right under them. Statistical significance at the 0.1, 0.05 and 0.01 level is denoted by (*), (**) and (***), respectively. Results from the first-stage regression appear first, and the second-stage estimates are next to the first-stage results.

Model	(1)		(2)		(3)	
Unsystematic Risk	0.312 ***	0.062 **	0.338 ***	0.067 *	0.276 *	0.084 **
	(0.000)	(0.035)	(0.000)	(0.077)	(0.076)	(0.014)
Pension %	-0.274 ***	0.117 ***	-0.239 ***	0.105 ***	-0.283 ***	0.051 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Substitute Plans	0.058	0.016	0.023	0.018	0.038	0.023 **
	(0.119)	(0.349)	(0.563)	(0.259)	(0.284)	(0.014)
Entrenchment	-0.437	-0.791 ***	-0.582	-0.669 ***	-0.232	-0.870 ***
	(0.216)	(0.001)	(0.155)	(0.009)	(0.487)	(0.000)
Exec. Equity		0.198 **		0.195 *		0.014
		(0.023)		(0.070)		(0.138)
Firm Size	0.625 ***	-0.136 ***	0.594 ***	-0.124 **	0.572 ***	-0.002
	(0.000)	(0.008)	(0.000)	(0.040)	(0.000)	(0.926)
ROA	0.537 *	-0.301 ***	1.723 ***	-0.416 *	0.366 ***	-0.017
	(0.084)	(0.008)	(0.000)	(0.059)	(0.000)	(0.301)
Liquidity	0.419 ***	-0.128 **	0.289 *	-0.069	0.362 **	-0.033
	(0.000)	(0.029)	(0.097)	(0.278)	(0.017)	(0.402)
Leverage	-0.295 ***	0.073 ***	-0.288 ***	0.074 ***	-0.147 ***	0.006
	(0.000)	(0.001)	(0.000)	(0.004)	(0.000)	(0.434)
FCF Ratio	1.403 ***	-0.327 **	0.954 ***	-0.229 *	0.071	-0.019
	(0.000)	(0.023)	(0.003)	(0.090)	(0.805)	(0.764)
Sales/Employee	-0.057 ***	0.006	-0.064 ***	0.009	-0.046 ***	-0.007
	(0.001)	(0.450)	(0.000)	(0.387)	(0.005)	(0.121)
Marginal Tax Rate	-0.191	0.050	-0.184	0.054	-0.264 *	0.014
	(0.203)	(0.318)	(0.260)	(0.324)	(0.065)	(0.688)
Takeover Interest	-0.019	0.046 **	-0.021	0.039	0.031	0.035 **
	(0.781)	(0.048)	(0.768)	(0.106)	(0.628)	(0.012)
Avg. Exec. Age	-0.009 **					
	(0.019)					
Avg. Exec. Tenure			-0.003 **			
			(0.048)			
HHI					0.609 ***	
					(0.000)	
Wald Chi-square		1384.41		1016.97		219.61
P-value		(0.000)		(0.000)		(0.000)
% Predicted correctly		84.25%		84.31%		93.83%
Outcomes = 1		199		156		219
Outcomes = 0		2,994		2,502		3,251
# Obs		3,193		2,658		3,470

Table 1.7 - Determinants of Employee Stock Ownership Plan Terminations, Pre- and Post-Enron Subsamples

This table displays results from simple probit and conditional probit regressions of the corporate decision to terminate an Employee Stock Ownership Plan on explanatory variables. The variables of interest represent the investment risk, executive compensation and plan entrenchment measures. The sample period covers publicly-traded firms from 1992 – 2008. Marginal effects are presented below, and their corresponding p-values are listed in parentheses right under them. Statistical significance at the 0.1, 0.05 and 0.01 level is denoted by (*), (**) and (***), respectively. Results are obtained via Maximum Likelihood Estimation.

	Panel A: Pre-Enron Sample				*Panel B: Post-Enron Sample*			
Model	(1)		(2)		(3)		(4)	
Unsystematic risk	0.092		0.076		0.105	***	0.085	**
	(0.141)		(0.250)		(0.001)		(0.014)	
Pension %	0.045	***	0.045	***	0.071	***	0.062	***
	(0.002)		(0.002)		(0.000)		(0.000)	
Substitute plans	0.031	**	0.031	**	0.017		0.015	
	(0.025)		(0.024)		(0.126)		(0.163)	
Entrenchment	-0.771	***	-0.789	***	-0.931	***	-0.834	***
	(0.000)		(0.000)		(0.000)		(0.000)	
Exec. equity	0.002		0.001		-0.005		-0.006	
	(0.719)		(0.867)		(0.275)		(0.198)	
Firm size	-0.016	***	-0.016	***	-0.004		-0.003	
	(0.005)		(0.006)		(0.444)		(0.491)	
ROA	-0.020		-0.021		-0.020	**	-0.021	**
	(0.131)		(0.108)		(0.034)		(0.025)	
Liquidity	-0.057		-0.057		-0.053		-0.035	
	(0.263)		(0.260)		(0.271)		(0.461)	
Leverage	0.016	**	0.015	**	0.001		-0.001	
	(0.041)		(0.047)		(0.912)		(0.997)	
FCF Ratio	0.063		0.059		-0.052		-0.064	
	(0.567)		(0.592)		(0.499)		(0.397)	
Sales/Employee	-0.010		-0.012		-0.006		-0.004	
	(0.174)		(0.123)		(0.232)		(0.369)	
Marginal tax rate	-0.021		-0.023		0.031		0.034	
	(0.670)		(0.651)		(0.482)		(0.431)	
Takeover interest	0.016		0.019		0.058	***	0.062	***
	(0.337)		(0.291)		(0.007)		(0.004)	
Wald Chi-square	141.30		150.20		184.21		197.98	
P-value	(0.000)		(0.000)		(0.000)		(0.000)	
% Predicted correctly	77.34		79.34		94.25		96.08	
Outcomes = 1	106		106		113		113	
Outcomes = 0	1451		1451		1800		1800	
# Obs	1557		1557		1913		1913	
Time fixed effects	No		Yes		No		Yes	

CHAPTER 2

HOW DOES EXECUTIVE COMPENSATION AFFECT PENSION CHOICE?

1 Introduction

Firms pay both executives and non-executive employees with wages, bonuses, equity, and deferred compensation to attract and retain a talented labor force and shape their incentives. In 2007, publicly-traded firms in the U.S. spent nearly $15 billion on contributions to pension funds for their employees and used over $21 billion to compensate top-level executives, over 40% of which was in the form of equity-based pay. Using equity as executive pay ties the wealth of these influential employees to the firm's value and stock price, and providing pension plans to rank-and-file employees is the most prevalent form of deferred pay. Do boards or firms consider the payoffs from the compensation tools they use to pay top executives when they choose the deferred pay plans they offer to non-executive employees? Because a firm's cash flow volatility and market value reflect the financial status and riskiness of the pension plans it offers, pension choices impact executive wealth at firms using equity-based pay. A firm's value increases with the adoption of a defined contribution pension plan because this action shifts pension risks from shareholders to employees and allows firms the flexibility of adjusting pension contributions to match outflows with inflows, ultimately benefitting those executives holding own-company stock and options.

I investigate the channel that links executive compensation and non-executive employee pension plans by modeling the decision to adopt a defined contribution (DC) plan as a function of the firm's executive equity-based pay. I test two hypotheses based on corporate finance theory and systematic patterns from the pension and executive compensation literatures using a panel dataset of publicly-traded firms from 1992-2007. Using equity as executive compensation creates both an incentive to increase firm value and an incentive to increase firm risk. Given the former incentive, firms with higher equity-based

pay should be more likely to adopt a DC plan, since the lower risk and more flexible contribution requirements of DC plans increase operating flexibility and decrease cash flow variability, ultimately reducing the probability and cost of financial distress and increasing the firm's value. Given the latter incentive, firms with higher levels of executive option grants should be less likely to adopt a DC plan if the risk-effect dominates the stock-price effect, since the reduction in firm risk decreases the value of options held by executives.

I find that firms are more likely to adopt a defined contribution plan when executives receive a higher proportion of compensation through equity, and this relation is both statistically and economically significant. According to initial results, a one percent rise in equity-based pay as a proportion of total pay increases the likelihood of DC adoption by around one percent, regardless of whether I use the CEO's equity-based pay or aggregate top executive equity-based pay. However, these initial results may be subject to endogeneity bias. Firms in the U.S. once favored defined benefit (DB) plans, yet in a remarkable turnaround that began in the 1970's, they shifted towards DC plans.[30] This trend occurred during a time period when firms greatly increased executive pay, driven in part by the increasing popularity of compensating executives with equity starting in the 1980's and 1990's (Bebchuk and Grinstein, 2005). Because an unknown factor could be driving these two trends, [31] I use an instrumental variables approach to address potential endogeneity bias resulting from an omitted variable problem. I find that the magnitude of the relation is much stronger: a 1% increase in the proportion of a firm's executive equity-based pay renders the firm as much as 22% more likely to adopt a DC plan.

I find initial support for the conjecture that the reduction in firm risk caused by DC initiations deters their adoption in firms particularly reliant on newly-granted equity instruments, as a one percent

[30] Traditionally, assets under management statistics, participating employee rates, and plan incidence rates for DB plans dwarfed those for DC plans. In 1975, DB plans comprised 70% of the total number of pension plans in existence and covered 74% of employees participating in pension plans. By 2009, DB plans accounted for less than 15% of total plans, and the percentage of participants covered by DB plans dropped to around 30%. Source: Department of Labor Form 5500 Historical Tables Database

[31] The business press points to a connection between the two trends, charging that firms enabled increased spending for executive compensation by cutting or adjusting deferred compensation plans for rank-and-file workers. Examples include the following: Schultz, Ellen. "Who Killed Private Pensions?" *The Wall Street Journal* September 17, 2011, and Schultz, Ellen and Theo Francis. "US: Companies Tap Pension Plans To Fund Executive Benefits", *The Wall Street Journal,* August 4, 2008.

increase in the proportion of equity granted as executive pay decreases the likelihood of DC plan adoption by 2%. However, the relation disappears once I account for endogeneity. Given that the proportion of a CEO's pay dedicated to options does not significantly affect a firm's pension decision, I find little support for the hypothesis that firms employing higher option-based compensation avoid adopting DC plans because they reduce the firm's risk.

I conduct two analyses to ensure the results are robust. I first model the decision to terminate or freeze a DB plan in place, since this action affects the firm in a manner similar to DC adoption. I reach comparable conclusions to those based on the DC adoption results, except I find that the impact of executive equity pay on this particular pension decision is stronger than it is on the DC adoption decision. I next focus on the aggregate pension schemes of sample firms in an effort to explore how the variable nature of DC contributions and low pension risk drives firms to adopt them. Firms bearing heavier pension burdens significantly drive the positive relation between equity-based executive compensation and pension choice, and given that these firms with higher fixed contribution requirements and larger pension liabilities have the potential to benefit most from a DC adoption, this extension further supports the economic motivations.

To understand the factors underlying this tradeoff between executive compensation and pension choice, I conduct two further analyses. First, I examine an aspect of the governance structures of the sample firms to better understand the types of firms driving these results. I find that the relation between executive compensation and pension choice is driven by firms with higher levels of managerial power. I interpret this as an indication that managerial incentives play a large role in the decision-making process that governs how changes to company-wide pension plans affect their compensation. Finally, since pension plans affect cash flow variability, which is one component of firm risk, I explore the rationale that firm risk can be driven by good firm characteristics in addition to uncertainty. Given that cash flow volatility and idiosyncratic volatility are highly correlated, firms with idiosyncratic volatility not driven

by innovation—a "good" volatility driver—primarily compel the relation between executive equity pay and DC adoption decisions since they stand to benefit the most from incorporating these plans.

This study contributes to the resurgence in the finance literature examining the interdependence between pension plans and overall firm policies. For the most part, this growing body of research documents how pension policies affect other firm policies. For example, Frank (2002) shows how a firm's tax benefits are significantly affected by the asset allocation of its pension plans, and Rauh (2006) documents that sizeable pension contributions restrain a firm's investment activity. Stefanescu and Shivdasani (2010) uses corporate pension structures to address the theoretical puzzle of sub-optimal leverage use by firms, finding that accounting for pension contributions on taxable income explains over 30% of the under-leverage gap seen in the literature, and Bergstresser, Desai and Rauh (2005) demonstrates how executives adjust pension assumptions in an effort to manage overall earnings. Taking a different perspective, I demonstrate that pension policies are influenced by a firm's compensation policies, and taken in context with the studies above, my research highlights the importance of fully understanding the complex interplay between pension choices and overall firm choices.

Finally, this study bridges a gap between our understanding of two methods of employee compensation. Both the pension and executive compensation literatures study the impact of various forms of employee compensation on firm outcomes such as risk and financial policy, but previous work does not address whether the compensation and incentive structure for one set of agents directly affects the compensation and incentive structure for another agent or set of agents. I demonstrate an economically-motivated connection between pension policy and executive pay structure. The idea that managerial stakes influence executive behavior dates back to Jensen and Meckling (1976) and Leland and Pyle (1977). Jensen and Meckling (1976) documents that perquisites consumed by utility-maximizing managers vary inversely with their ownership stakes, and Leland and Pyle (1977) shows that informed entrepreneurs send a low-cost signal about their firm's future prospects by taking on equity stakes. Regardless of what motivates firms to use pay-to-performance compensation, previous studies that

examine the implications of shaping one agent's incentives in isolation—without considering the effects on the compensation of other firm agents—ignore a crucial connection. I show that firms consider the resulting effects of pension plans offered to rank-and-file employees on executive compensation when shaping their pension scheme. This existence of a previously-unexplored relation between different types of pay underscores the importance of re-examining the determinants and consequences of various compensation choices made by the firm.

This paper is organized as follows. Section 2 contains a review of the relevant literature. The hypothesis development and empirical methodology section follows in Section 3, while Section 4 describes the data and sample selection process. I present the main results and examine their robustness in Section 5. I extend the analysis of the results in Section 6, and Section 7 concludes the paper.

2 Literature review

Firms sponsor pension plans to compensate employees and attract and retain a workforce, and even though pensions used to be characterized as "off-balance sheet" entities, decisions regarding a firm's pension offering are non-trivial because they directly impact firm value. Early studies show that a firm's market value fully incorporates not only the funding status of its pension plans (Oldfield, 1977; Feldstein and Seligman, 1983; Bodie et al., 1987; Bulow, Morck and Summers, 1987; Bodie and Papke, 1992), but also plan asset and liability levels (Feldstein and Morck, 1983; Landsman, 1986; Barth, 1991)[32] as well as plan income and costs (Barth et al., 1992; Rauh and Stefanescu, 2009). Pension plan risk matters as well, in that a firm's equity beta closely incorporates the risk of its pension plans (Jin et al. 2006).

Private firms in the U.S. maintain two basic types of pension plans: defined benefit (DB) and defined contribution (DC),[33] and these plan types differ most with respect to the risks they oblige on firms

[32] On the other hand, Coronado and Sharpe (2003) suggests that ambiguity of a firm's pension funding status leads to market misvaluation of the pension's assets and liabilities. Franzoni and Marin (2006) shows that investors do not fully understand the impact of pension plans on a firm's earnings and cash flows.

[33] I provide a detailed description of each plan type in the Appendix. Firms do not have to choose between DB and DC plans. Indeed, most publicly-traded firms sponsor multiple plans concurrently, often including at least one of each type of plan. For example, 89% of firms

and employees as well as with respect to their flexibility of funding (Bodie et al., 1985; Rauh and Stefanescu, 2009). DB plans impose a liability on their sponsors since firms maintaining these plans promise to pay periodic sums to participants from retirement to death. As such, DB plans expose firms to longevity risk, and firms fund these obligations and bear both the responsibility of investment decisions and the investment risk of ensuring that the funds earn enough to cover future benefits. In contrast, the investment decision responsibility and risk with a DC plan lies with its participants, as does the longevity risk. With a DC plan, employers have no liability and no responsibility apart from making periodic contributions. When firms shift their focus from a DB to DC scheme, they effectively transfer pension-related risks from shareholders to employees (Broadbent et al. 2002), and Brander and Finucane (2007) finds that firms with higher ratios of DC assets relative to DB assets exhibit higher returns, attributing the performance differential to the low-risk aspect of DC plans.

DB and DC plans also differ in their contribution requirements.[34] Pension legislation limits minimum and maximum DB contributions, but DC plans offer their sponsors flexibility in setting annual contributions.[35] This is an important distinction because DB contribution inflexibility can affect a firm's ability to invest and undertake positive NPV projects. Rauh (2004) shows that firms decrease capital expenditures as mandatory DB contributions rise, even after controlling for correlations between plan funding status and the firm's unobserved opportunities for investment, while Campbell et al. (2009) finds that a firm's cost of debt increases with mandatory DB contributions. In contrast, the DC plan's contribution flexibility makes them attractive because they allow firms to adjust their planned pension contributions to match the fluctuations in their cash flows based on the financial health of the firms, which has the effect of reducing both operating leverage and cash flow variability. Operating flexibility

maintaining a primary DB plan in 2006 also maintained a DC plan, and nearly half of the publicly-traded firms sponsoring a DC plan also maintained another DC plan.

[34] Firms may temporarily store or remove internal funds in their pensions (Bodie, Light, Morck and Taggart, 1987), so flexibility in contributions serves to make a pension plan a form of internal slack (Ballester, Fried and Livnat, 2002) that firms adjust over time by manipulating pension policies in order to manage contribution volatility (Bader, 1991).

[35] It is important to note subtle differences in the types of DC plans that may affect the generalizations in this paper. Defined contribution plans include 401-K plans, 403-b plans, ESOPs, profit-sharing plans, cash balance plans and money purchase plans. 401-k plans, 403-b plans, ESOPs cash balance plans and profit-sharing plans are all alike in that they allow firms to vary contributions as they see fit. Money purchase plans are dissimilar from other types of DC plans because maintaining these plans stipulates that sponsors make annual contributions that are fixed as a percentage of wages (Petersen, 1994). I drop money purchase plan adoptions from my sample for this reason. For a more in-depth exploration of the rules (or lack thereof) governing contributions within DC plans, see Petersen (1994).

can have a major impact on a firm's cost of equity. Chen, Kacpercyzk and Ortiz-Molina (2011) use the labor union setting to demonstrate that operating flexibility constraints translate into a higher implied cost of equity. In the context of Chen, Kacpercyzk and Ortiz-Molina (2011), DC adoptions remove flexibility constraints. Again, in a sense, when DC plans enable firms to replace fixed with variable costs, they shift risk from the firm's security holders to its employees (Petersen, 1994). This aspect makes DC plans a hedging instrument for cash flow risk, and Petersen (1994) shows that the probability of DC plan sponsorship is positively related to both cash flow variability and financial distress costs. Milevsky and Song (2008) studies the wealth impact of replacing a DB plan with a DC plan, finding that this action is associated with a 3.8% positive abnormal return, supporting the intuition that DC adoptions positively benefit shareholders.

Executive compensation has four different components: salary, cash bonuses, deferred compensation, and equity-based pay such as restricted stock and options (Antle and Smith, 1986, Jensen and Murphy, 1990, and Bebchuk and Grinstein, 2005). Firms use equity-based pay to incentivize executives to increase firm value because the cash flows from restricted stock grants and option grants depend upon the firm's stock price.[36] Options in particular are asymmetric in the sense that these instruments offer the right to upside benefits without exposure to the downside, and since their values increase with their underlying asset's volatility, executives with option-based pay have an incentive to increase firm risk (Haugen and Senbet, 1981, Agrawal and Mendelker, 1987, Tufano, 1996, Rajgopal and Shevlin, 2002, Coles et al., 2003 and Chen et al., 2006).[37] The subtle differences between incentives created by equity-based pay in general and option compensation are the primary basis on which I base my hypotheses.

[36] While options traditionally made up a larger percentage of equity-based pay in the 1980's and 1990's, restricted stock grants have risen in popularity and now comprise a larger proportion of total pay than options.

[37] The notion that options induce managers to adopt risky projects is somewhat predicated on the assumption that managers are risk-averse. Carpenter (2000), Ross (2004) and Lewellen (2006) find evidence indicating that option-based pay can actually increase an executive's risk aversion.

3 Hypothesis development and empirical methodology

DC adoptions afford firms increased contribution flexibility. Unlike DB plans, which essentially require fixed contributions, DC plans allow firms to adjust pension contributions to match fluctuations in cash outflows, providing a form of internal slack and reducing the firm's operating leverage and cash flow variability (Petersen, 1994). Merton (1974) positively links cash flow uncertainty with default risk and cost of debt, and Smith and Stulz (1985) argues that firms manage risk to reduce their probability of distress, and firms with operating flexibility and low cash-flow variability are less likely to become distressed. A reduction in the probability of distress increases a firm's value to the extent that it reduces the expected cost of financial distress. In the Smith and Stulz (1985) context, pension choice is a risk management method. Therefore, the introduction of operating flexibility when adopting a DC plan effectively leads to an increase in firm value. If stock prices do rise, executives with equity compensation benefit from a DC plan adoption. Since executives at firms with higher proportions of equity pay benefit from the increase in firm value arising from DC adoptions, these firms should be more likely to adopt. This is the equity-value hypothesis.

DC adoptions also decrease firm risk, and there is the possibility that the decreased risk that results from DC plan adoption could have the opposite effect, since tying pay to performance can provide executives with an incentive to increase the firm's risk. The use of option contracts in particular creates a positive relation between executive wealth and firm risk due to the fact that an option's value rises with the volatility of the underlying asset. Since DC plans transfer most pension-related risks to employees and reduce the cash-flow variability of a firm, they reduce a firm's overall risk as well. Given that a decrease in risk devalues the option-based compensation granted to executives, firms with higher executive option pay should be less likely to adopt a DC plan, but the effect is not necessarily unambiguous. The magnitude and overall effect is likely biased because option values also increase with the underlying stock price, so the negative relation will only appear if the risk-reduction effect dominates the stock-price effect.

I test the effect of executive compensation composition on a firm's pension choice for rank-and-file employees by modeling the relation between a firm's proportion of executive equity-based pay on the firm's probability of adopting a DC plan, including controls for the firm's investment and capital structure policy as well as for factors that influence the firm's pension offering choice.[38] I focus on the proportion of equity-based compensation as a percentage of total compensation at the executive level, both for a firm's CEO and for all of the firm's top executives. Examining option-based pay in particular allows me to examine the risk-reduction hypothesis, so I also use the value of option grants in the observation year. Because firms either adopt a DC plan or do not, a probit model is appropriate. The regression specification is

$$ADOPT_{it} = \Phi(\beta' PropEqComp_{it} + \delta' Control_{it} + \theta_t + \varepsilon_{it}) \qquad (1)$$

where $ADOPT_{it}$ equals 1 if firm *i* adopts a defined contribution plan in year *t* and 0 otherwise. $PropEqComp_{it}$ is a matrix of different measures of executive compensation composition for firm *i* in year *t,* and $Control_{it}$ is a matrix of control variables relevant to a firm's pension choice. θ_t is a year fixed effect,[39] and ε_{it} is an error term. According to the equity-value hypothesis, equity-based executive compensation is more valuable when a firm adopts a DC plan since the flexibility and lower risk of a DC plan increases the firm's value. Thus, firms using larger proportions of equity-based pay should be more likely to adopt a DC plan and the effect of executive equity-based compensation should be positive. The risk-reduction hypothesis posits that a DC plan adoption decreases the value of executive equity-based pay comprised of options in particular, but given that option values also increase with underlying stock price, these two effects may counterbalance each other. Accordingly, the effect of the proportion of option-based pay as compensation on pension choice should be negative if the risk-reduction power of

[38] I restrict the examination to firms with DB plans in place because the benefits of incorporating a DC plan into their pension schemes are likely to be the strongest in these firms. Rauh and Stefanescu (2009) shows that the increased popularity of the DC structure in the U.S. was driven mainly by firms with primary defined benefit plans in place, which is consistent with the economic story of this paper. Furthermore, focusing only on the decision to adopt a DC plan would also likely capture the effects firms emerging from reorganization or restructuring efforts as well as new firms beginning to form their pension offerings.

[39] I include year fixed effects to control for annual changes in factors not modeled in the specifications that may affect the outcome variable.

DC plans deters their adoption and positive if the stock price effect dominates to encourage their adoption.

4 Sample construction and data description

I create a panel dataset from 1992-2007 using Compustat's Execucomp database and Internal Revenue Service Form 5500 pension data. I provide a detailed explanation of the sample selection process in the Appendix.[40] Table 2.1 contains a breakdown of the number of DB and DC plans maintained per year and DC plans adopted as well as the number of DB firms choosing to adopt DC plans. Panel A and Panel B contain these statistics for all publicly-traded firms and for those publicly-traded firms that make up the final sample, respectively. DB plan incidence fell over the sample period, while DC plan incidence generally increased or held steady.[41] Publicly-traded firms sponsored the largest number of DC plans in 2001, which is interesting considering the trend that was occurring simultaneously in executive compensation: even though equity compensation increased considerably in publicly-traded firms starting around 1993, the literature suggests that it peaked in 2002 (Bebchuk and Grinstein, 2006).[42] The third column indicates that DC adoptions slightly slowed over the sample period, before picking up briefly in the early 2000's, after which point adoptions decreased moderately each year.[43]

[40] Boston College's Center for Retirement Research makes these files available to the public on their website, for which I am very grateful. Source: Center for Retirement Research at Boston College. 5500-CRR data: Panel of Current and Usable Form 5500 Data. Chestnut Hill, MA.

[41] The number of plans per firm, which is not represented in the table but consists of the sum of DB and DC plans each year, fell over the time period due in part to firms' efforts to streamline their pension schemes and save on costs. In 1992, 3,441 publicly-traded firms sponsored 2.34 plans per firm, on average. In 2007, 3,118 firms sponsored an average of 1.64 plans per firm. There are a number of factors that caused the marked increase in DC plan popularity along with the decline of the DB plan. Changing market conditions, altered legislation and shifts in labor market attributes are the most commonly cited external factors, while differentials in pension risk and cost associated with the different types of plans are cited as internal drivers of this trend (Rauh and Stefanescu, 2009; Munnell et al., 2007; Clark and McDermed, 1990; Gustman and Steinmeier, 1992 and Buessing and Soto, 2006). According to Munnell and Soto (2006), although the pronounced shift from DB to DC plan structure persisted throughout the period examined, the slight decline in DC plans and total plans after 2002 can be attributed to effects of the stock market crash and financial market weaknesses during these years.

[42] While the proliferation of equity-based compensation for executives occurred starting in the 1980's and 1990's, firms began increasing total executive pay rapidly in the 1970's, and this trend continued well into the 2000's. Options comprised approximately 20% of total chief executive officer pay in 1992, and by 2000 this figure reached 50%. However, after the 2000-2001 period, restricted stock rose in popularity and it replaced options as the dominant equity-based compensation tool by 2006 (Frydman and Saks, 2010). My tabulations of executive compensation confirm these contemporary trends, and this information is discussed later in the paper and appears in Table A2 of the Appendix.

[43] While I cannot obtain statistics on the pension schemes of publicly-traded firms prior to 1990, examining pension statistics prior to the sample period may provide insight into trends in publicly-traded firms as well. According to the Department of Labor, DB pension plans incidence increased from 1975-1983, after which point plan incidence stagnated and began to drop. DC plan incidence increased every year since 1975. In 1990, the number of plan participants in DC plans exceeded the number of plan participants in DB plans. When considering only active participants, DC participant rates increased DB rates in 1984. Total assets in DB plans were outpaced by total assets in DC plans in 1996, but sponsor contributions to DC plans overran contributions to DB plans in 1984. Source: Department of Labor website (www.dol.gov/ebsa/pdf/historicaltables.pdf)

The final two columns in Panel B display the time series of plans for sample firms that meet the data requirements of this study. The fourth column shows how DC adoptions slowed over the mid-to-late 2000's, indicating that my sample period may only cover the later portion of the shift in popularity towards DC plans. The final column provides the annual incidence of DC adoptions by firms with DB plans in place. The largest share of firms adopting DC plans is associated with the earlier half of the sample, as the incidence of DC adoption by a firm maintaining a DB plan tapers off after the early years of the sample.[44]

I measure executive equity-based compensation in a number of different ways, consistent with both prior literature and the economic motivations of this paper, and I construct these measures both for a firm's CEO and for the firm's top-ranking executives in aggregate. This information is summarized in Table A2.1 in the Appendix. The CEO, a firm's most important employee, affects the firm's financial position and future prospects (Bertrand and Schoar, 2003), and firms compensate them accordingly. Examining the CEO's equity-based compensation allows for a more precise estimation of the importance of equity-based pay for the most influential and highly-paid employee. I use aggregate executive compensation to ensure results are robust and examine the influence of executive compensation in aggregate on a firm's pension choice.[45]

The first measure of equity pay is the value equity-based pay *held* by an executive, equal to the sum of all grant-date value of outstanding restricted stock shares and the Black-Scholes value of outstanding options, as a proportion of total compensation paid by the firm in the observation year.[46] This measure includes only equity and options granted in the years prior to the observation year. Since both

[44] The increasing popularity of the DC plan and the decreasing use of DB plans occurred concurrently, but these trends began as early as the mid-1970's, and several empirical studies examined the drivers of DB terminations and the increasing popularity of the DC structure in the early portion of these trends (e.g., Mitchell and Mulherin, 1989). Overall, the research and plan statistics imply that the trends peaked around the late 1980's and early 1990's. Since my sample starts in 1992, I am likely to only pick up the tail-end of the switch from DB to DC plans, which may work against uncovering a significant relation in empirical specifications.

[45] Despite a CEO's individual importance, non-chief executives are likely to have a large collective impact on the firm's current and future position, and basing some analysis on their collective or averaged compensation may be less likely to capture the effect of any one executive's demand for a certain type of pay on the firm's compensation scheme. Additionally, considering the importance of equity-based pay for all top-ranking executives may provide a more far-reaching measure of the importance of equity-based pay in contrast to the ability of CEO executive compensation measures to provide a more precise measure of the importance of equity-based pay.

[46] I use an executive's total pay in the current year as the denominator because it is impossible to attribute the restricted stock and option grants to specific previous pay years.

restricted stock grants and option grants do not vest for two to six years, the value of equity-based pay held in any year by an executive is the unvested restricted stock and option grants from previous years.[47] This measure captures a firm's *past* reliance on equity pay for executives. I use the value of an executive's equity-based pay *granted* in the observation year divided by the total compensation paid to that executive as the second executive compensation composition proxy. The total equity grant value is the sum of the grant-date value of new restricted stock plus the Black-Scholes value of new options granted to an executive. Grants solely reflect the current year's equity-based awards, so they precisely measure a board's influence on the incentive structure of the executive, making grants a better measure of the *current* and *future* importance of equity pay.[48] Equity instruments held reflect previously-granted awards still remaining after any vested instruments are sold, and since firms cannot adjust previously-awarded compensation incentives or control executives' abilities to exercise vested instruments (Ferreira et al., 2010), this measure may more fully reflect the firm's *past* reliance on equity as compensation.[49] The final measure of executive compensation is simply the Black-Scholes value of current option awards granted to an executive as a proportion of that executive's total pay. This metric captures the incentive to increase firm risk that is associated with options in particular. I provide a summary of these executive compensation measures as well as a breakdown of the proportion of equity-based pay components for sample firms and Execucomp universe firms in table A2.2 in the Appendix.

I also control for factors affecting the firm's pension decision that lie outside the focus of this paper. I use an indicator variable to flag firms subject to collective bargaining agreements to proxy for union presence.[50] I include a measure of employee impact to proxy for employee importance because DB plans allow firms to encourage retention while DC plans are preferred by more mobile employees. I

[47] Information on vested restricted stock is not available prior to 2006.

[48] Ferreira, Laux and Markarian (2010) claim that "boards cannot fully control the incentive structure provided by previously awarded compensation—but they can react in the current year, considering executives' choices to sell shares or hedge options, to provide a compensation that is the fullest measure of a compensation decision."

[49] Option grants and restricted stock grants are not included in the measure of equity-based pay held, as it is assumed that these grants are provided to executives at the very end of the year. Accordingly, the two measures of equity-based pay (held and granted) are completely separate measures.

[50] Although unions do not have significant power to influence employer contributions made to DB or DC plans (Cheng and Michalsky,2010), they may influence the pension choice itself, employee participation rates as well as investment choices and performance (Even and MacPherson, 2010), which is why I include this variable. In general, union pension plans are more likely to be DB plans than DC plans (Freeman, 1985).

construct this variable as the growth in net income from the previous year to the observation year, divided by the number of employees.[51] I include the log of a firm's variability of cash flows over the ten years prior to the observation year to estimate the influence of cash flow variability on a firm's pension choice (Petersen, 1994), and I use the log of cash and marketable securities on hand to represent liquidity. Because DC plans generally provide more tax advantages, I include each firm's marginal tax rate to control for the tax motivations that lead firms to adopt DC plans (Graham, 1998). I also control for the firm's size, performance, and investment opportunities by including sales, return on assets and the market-to-book ratio of assets, respectively.[52] I include each firm's annual stock return from the year prior to the observation year to control for the stock price effect and stock market performance. Finally, I use the dollar value of a firm's discretionary accruals, net of industry discretionary accruals, scaled by total assets to proxy for a firm's propensity to be subject to earnings manipulation, since DB plans enable managers to directly affect firm earnings while DC plans do not (Bergstresser et al., 2006).[53]

Panel A in Table 2.2 contains a univariate analysis of DC adopters and non-adopters based on the variables of interest and control variables. The summary data shows that the average values of most of the measures of equity-based compensation are higher for DC adopters than for non-adopters, but not overwhelmingly so. Indeed, a t-test of equal means indicates that the average proportion of pay devoted to options for both the CEO and aggregate executives in adopting firms is significantly greater than for non-adopters. T-tests of control variables means imply that adopters are significantly different from non-adopters based on a number of metrics. The first major difference between the two subsamples is evident in the level of cash flow: adopting firms seem to be cash-strapped compared to non-adopting firms, which is consistent with the notion that the adoption of a DC plan often requires a large immediate one-time

[51] In addition to net income growth per employee, I tried two additional measures of employee impact in the interest of robustness. First, I use sales growth per employee, which is constructed as the growth in the dollar value of sales from the year prior to the observation year and the observation year divided by the firm's total employees, in thousands. Second, I use economic value added per employee, as in Kedia and Mozumdar (2002) and Core and Guay (2001), which is constructed by dividing the difference between market and book value of equity by the total number of employees. The results with these variables are similar to the results presented in this paper.

[52] The market-to-book ratio is subject to measurement (Erickson and Whited, 2000). I use an alternative proxy, referred to as "macro" market-to-book ratio that is not as prone to measurement error and the results are qualitatively similar.

[53] Accruals are a component of earnings that is not reflected in the statement of cash flows. Given that management discretion largely determines accruals amounts each reporting period, managers can use accruals to temporarily inflate or deflate income.

cash outlay by the sponsoring firm.[54] Adopters also exhibit significantly higher cash flow variability than their counterparts, consistent with the notion that firms adopt DC plans to substitute variable for fixed cash flows (Petersen, 1994). Third, firms that adopt DC plans have more collective bargaining agreements than non-adopters, which suggests that they have more labor contracts to negotiate. In addition, adopters have significantly higher tax rates, and even though they are significantly smaller than their counterparts in terms of sales scaled by total assets, they have a higher average ROA and market-to-book ratio than non-adopting firms.

Panel B of Table 2.2 compares my sample to the universe of S&P 1500 firms comprising the Execucomp database (where I obtain executive compensation variables) and to the Compustat universe of firms (control variables). The average proportion of equity-based pay held, both for all executives and for CEOs only, is greater in the sample firms than in the universe of S&P 1500 firms, and the average proportion of equity-based grants is slightly larger for universe firms. Sample firms pay a larger proportion of options to all executives and to the chief executive officer than universe firms, on average. T-tests of differences in means confirm that these differences are significant for the proportion of equity-based pay held and options as pay.

A comparison of the control variables suggests that sample firms differ from universe firms based on t-tests of differences in means. Recall that publicly-available firms maintaining a DB pension plan that file a Form 5500 and pass all the data requirements comprise the sample, while universe firms are publicly-traded firms. Universe firms have a far greater average need for retention than sample firms, and the average variability of cash flows in sample firms is far greater than in the universe firms. ROA, liquidity, marginal tax rates and sales averages are also higher in the sample firms than the universe firms, although the market-to-book ratio is slightly higher for universe firms than sample firms. Overall, it appears that sample firms are larger, more liquid and more successful than universe firms, and the

[54] Rauh and Stefanescu (2006) point out that when a firm establishes a DC plan, they often must deposit funds immediately into the accounts of participating employees. Even though the medium and long-term effects of DC plan adoption should decrease the risk and cash flow variability of the firm, the firm suffers from decreased capital in the short-term.

differences between the sample firms and universe firms should be kept in mind when understanding the results of this study.

5 Effect of executive compensation on pension choice

5.1 Simple estimates of effect

Table 2.3 contains the results of probit regressions of a firm's pension choice on various measures of its CEO equity-based pay proportion (Panel A) and executive equity-based compensation aggregated across top executives (Panel B), including year fixed effects.[55] The positive effect of the CEO's proportion of equity-based pay held supports the equity-value hypothesis, as a 1% increase in equity-based pay held renders the firm slightly more than 1% more likely to adopt a DC plan. Column 5 in Panel B presents similar results for a 1% increase in executive equity pay, aggregated across top executives. However, when I use the proportion of equity-based pay granted instead of held, the results offer a different conclusion: a one unit increase in the proportion of equity-based pay granted to the CEO and top executives lessens the likelihood of DC adoption by 2.2% and 2.6%, respectively. When I include both measures of executive compensation in the same regression, as seen in column 4 and column 8, the opposite signs and significance endure. The fact that the effects of both the proportion of equity-based pay held and the proportion of new equity pay grants in Panel A and B are significant seems to indicate that both past and future executive compensation composition factor into a firm's pension plan decision. Since the coefficients have different signs, I address this in further analysis. When I use the proportion of option-based pay in particular, the results produce insignificant marginal effects.

On the whole, the conditional probit results are informative because they indicate that executive compensation is related to pension decisions, but since the results provide support for both hypotheses,

[55] I do not include firm fixed effects because there is not enough within-firm variation to justify them.

they suggest conflicting conclusions. I take this as evidence of inconsistency induced by endogeneity-bias and conduct more appropriate econometric analysis to address this bias.[56]

5.2 Estimates of effects after addressing for endogeneity-bias

The demonstrable shift from DB to DC plan began in the 1970's, considerably increased during the 1980's, and peaked during the 1990's and early 2000's. Equity became an increasingly important component of executive pay during these same two decades, even though firms increased overall executive pay spending starting in the mid-1970's. If some unobservable force played a part in both of these trends, then omitting it from the specifications causes equity-based executive pay to be endogenous, which leads to biased or inconsistent parameter estimates. I address this concern with an instrumental variables approach, which involves choosing instruments that affect the firm's executive compensation structure but not the firm's pension choice so that instruments affect the pension decision only indirectly through their influence on executive equity compensation.

Institutional ownership is a firm-level characteristic that likely satisfies the requirements for a good instrument. Institutional ownership influences executive compensation since a firm with a higher proportion of institutional ownership is more likely to employ pay-to-performance tools like restricted stock and option grants because doing so ties the executive's wealth to the firm's stock price, thereby aligning managerial interests with the interests of their influential and outspoken institutional owners (Hartzell and Starks, 2003).[57] Hartzell and Starks (2003) document that an increase of one standard deviation in their sample's institutional ownership results in a 20% increase in an executive's option-grant sensitivity to stock price changes. Research suggests that institutional owners affect firm choices beyond

[56] Alternatively, given that current equity pay is highly influenced by past equity pay, these conflicting results may be explained by decreasing marginal value of pay-to-performance compensation tools: as the amount of equity compensation held by an executive rises, the marginal benefit of additional equity paid that executive receives falls. This could be due to a number of factors. For example, executives may be driven by diversification principles to discount any additional equity-based pay received if they already hold equity compensation, or firms may reap smaller benefits from additional incentive alignment because prior levels of equity-based pay have achieved an optimal amount of incentive alignment.

[57] Edmans and Manso (2011) documents that institutional equity investors are more effective and active monitors.

executive compensation, such as payout and distribution policies and corporate restructuring activity,[58] so it is possible that these investors also influence the pension choices of the firms they invest in. While institutional ownership is exogenous, I explore its direct effect on pension choice in unreported regressions, which show that institutional holdings do not significantly influence pension choice. Therefore, I use institutional ownership as the primary instrument, measured as the fraction of outstanding shares owned by institutional investors.

Additionally, to the extent that restricted stock payoffs and option payoffs differ, it is worth investigating the risk-reduction hypothesis using an instrument particularly suited for options. I use the lagged proportion of options granted to instrument for current proportion of options granted, and since prior equity pay influences current and future equity pay (Core et al., 2008), this instrument is commonly used in the executive compensation literature.[59]

Panel A in Table 2.4 provides the results of these instrumental variable regressions with CEO executive compensation measures as the explanatory variables of interest and Panel B provides the results of identical regressions using aggregate executive compensation measures as the explanatory variables of interest. In the first column, the proportion of equity-based pay held by the CEO is a positive and significant factor in pension choice, lending support to the equity-value hypothesis, as a one unit increase in this variable renders the firm over 13% more likely to adopt a DC plan. When I use the proportion of a CEO's pay devoted to equity-based pay granted, the results provide further support for the equity value hypothesis, as a one percent rise increases the probability of DC adoption by over 18%.

Panel B shows the estimates of similar regressions using aggregate executive compensation measures. A one percent increase in the proportion of top executive equity-based pay held and granted renders the firm nearly 17% and over 22% more likely to adopt a DC plan, respectively. These results

[58] Institutional owners affect the payout and distribution policies (Grinstein and Michaely, 2005), corporate restructuring activities (Gaspar, Mass and Matos, 2005), executive compensation (Hartzell and Starks, 2003), hiring or firing activity (Huson, Parrino and Starks, 2001), analyst coverage (Ljundqvist, Marston, Starks, Wi and Yan, 2007) and corporate governance choices (Gillan and Starks, 2000).
[59] For example, see Kuhnen and Niessen (2012), Tumarkin (2010), Chowdhury (2009), Ozkan (2007) and Baranchuk (2006).

provide further support for the equity-value hypothesis, and they indicate that executive compensation in the aggregate has a slightly stronger influence on pension choice than previous estimates imply.

In unreported regressions using managerial tenure as an instrument (as a proxy for executive risk-aversion), I find very similar results to those examined above.[60] The instrumental variable probit regressions provide strong support for the equity-value hypothesis and resolve the conflicting support for both hypotheses that conditional probit regressions implied.

5.3 Robustness checks

Based on the economic story, the firms driving these results are those in which the contribution flexibility and low risk of a DC plan are likely to have the largest impact on operating leverage, cash flow variability and firm value, and therefore are likely to have the largest impact on executive equity-based pay cash flows. This assertion is supported by a more in-depth examination of the sample firms and regression results.

Examining the robustness of my results requires a better picture of the total pension structure of DC adopters vs. non-DC adopters, as well as an analysis of a pension decision that may substitute for a DC adoption. First, I model the decision to terminate or freeze a DB plan in place using the methodology applied to the DC adoption decision. Since both of these actions affect the operating flexibility of the firm in similar ways, comparing the similarities in the marginal effects of executive compensation variables over the two basic specifications sheds light on the results of this paper. Second, I examine pension statistics aggregated at the firm level to understand the entire pension plan offering and burdens that sample firms bear. Accurately portraying the firm-level pension picture of the sample firms is crucial in

[60] In alternative IV probit specifications, I use executive tenure as the instrument instead of institutional holding. In these results, both the proportion of CEO equity-based pay held and granted produced marginal effect estimates that are positive and significant, providing further support for the equity-value hypothesis. One unit increases in the proportions of equity compensation held and granted increase the probability of DC adoption by 15% and 28%, respectively. Using aggregate top executive pay measures produces a slightly larger impact on pension choice, as a one percent increase in aggregate equity pay held and granted renders the firm nearly 19% and 31% percent more likely to adopt a DC plan.

understanding what types of firms DC adoptions impact the most, because the majority of publicly-traded firms offer multiple pension plans.[61]

5.3.1 Does executive compensation also affect DB terminations and freezes?

I study a pension choice that affects the firm in a similar way as DC adoption to shed more light on the types of firms driving the empirical results of this paper. While firms with DB plans benefit from adopting a DC plan because doing so reduces the firm's cash flow variability and increases the firm's operating flexibility, terminating or freezing a DB plan in place achieves a similar effect (McFarland, Pang and Washawsky, 2009 and Rubin, 2007). A DB termination ends a plan, triggering immediate liquidation and forcing the firm to pay all accrued benefits to participants, while a freeze closes a plan to new entrants and halts the growth of previously-enrolled participants' account balances at the time of the freeze. In this respect, a DB termination allows a firm to shed a pension obligation and rid itself of the fixed contribution requirements associated with the plan, and a DB freeze allows a firm to halt future growth of a pension obligation and suspend the fixed contributions required by a DB plan. In the sense that a DC adoption increases a firm's operating flexibility through its contribution flexibility, a DB freeze or termination increases a firm's operating flexibility by cutting an inflexible outflow. Accordingly, the effects of the various executive compensation measures should have a similar impact on the decision to terminate or freeze a DB plan as they do on the decision to adopt a DC plan. Because a termination or freeze allows a firm to shed or shrink a pension liability, terminations or freezes may affect firm risk and value to a larger degree than the increased operating flexibility and decreased cash flow variability that comes with a DC plan adoption.

I collect information on DB plan freezes and terminations from IRS Form 5500 pension data, and assign an indicator variable equal to one if a sample firm froze or terminated a DB plan in the observation year. I compare the DC adoption and DB termination/freeze decisions separately using the empirical

[61] In 1992, 3,441 publicly-traded firms sponsored 2.34 plans per firm, on average. In 2007, 3,118 firms sponsored an average of 1.64 plans per firm. The typical firm offers at least one of each type of plan (DB and DC), and more firms maintain multiple DC plans than DB plans.

methodology that I used to model DC adoptions to the DB termination/freeze decision. Table 2.5 presents results from instrumental variable probit regressions of various measures of executive compensation on the decision to terminate or freeze a DB plan, including firm controls and time fixed effects. Institutional holding instruments for both the proportions of equity-based pay granted and held, while lagged ratio of option grants to total pay instruments for the proportion of pay granted as options. Panel A's estimates provides support for the equity-value hypothesis as the positive and significant marginal effects indicate that a one percent increase in the CEO's proportion of equity-based pay held and proportion of equity-based pay granted increase the firm's probability of DB termination or freeze by 31% and 41%, respectively. For top executives in aggregate, a one percent increase in equity-based pay held and granted increase the likelihood of DC adoption by 36% and 47%, respectively. Compared to the marginal effects estimates contained in Table 2.3, it appears that executive compensation affects the decision to terminate or freeze a DB plan to a much larger degree than the decision to adopt a DC plan. While interpreting this result in particular requires an examination of the subtle effects of DB terminations and freezes on firm value, it indicates that a pension freeze affects firm value more robustly than a pension adoption. Interestingly, when I use the proportion of options granted to the CEO and top executives in aggregate, the marginal effects are significant and positive, indicating further support of the equity-value hypothesis. A 1% increase in the proportion of newly granted options out of the total pay of the CEO and top executives increases the probability of DC adoption by 41% and 44%, respectively.

5.3.2 How do firm-level pension characteristics affect the relation between executive compensation and pension choice?

To create a detailed portrait of each firm's pension offering, I collect information on every pension plan that the publicly-traded firms in my sample sponsored, and collapse the participant and financial information from each individual plans into annual firm-level statistics. Table 2.6 contains a univariate analysis of this information, categorized into the subsamples of DC adopters (Panel A) and non-DC adopters (Panel B). DC-adopting firms sponsor more plans (including more DB plans, on

average), contribute more funds to a greater number of individual pension accounts and maintain larger pension obligations than their non-adopting counterparts, on average. This indicates that they bear a larger retirement benefits burden, even though these firms are significantly smaller and no more labor-intensive than non-DC adopters.[62] Despite the fact that they bear a larger retirement benefits burden than their counterparts, DC adopters have lower pension asset levels, on average, indicating that their obligation to contribute to their plans may be a strain on firm resources. T-tests for differences in means confirm that these differences are statistically significant. Taken altogether, this evidence indicates that adopters are precisely the type of firm in which the initiation of a DC plan will likely have the strongest impact on firm value at the time of adoption.[63] To test this assertion, I divide my sample into firms with above-average and below-average current liability amounts and re-run the probit regressions using the CEO compensation measures as the primary explanatory variables, including controls and year fixed-effects.[64]

Table 2.7 shows the results of instrumental variables regressions, using institutional holding as the instrument. Panel A presents the marginal effects estimated from the subsample of high pension liability firms, and Panel B pertains to estimates for low pension liability firms. Based on the economic story developed in this paper, I expect the firms more burdened by pension obligations, proxied by their firm-level current pension liability levels, to drive the relation between executive compensation and pension choice. The marginal effects of these firms should be larger in magnitude than the estimates for those firms with low relative pension burdens. The results strongly support this assertion. Each of the marginal effects of two measures of equity-based pay are positive and significant in Panel A, while the effects of both CEO and aggregated top executive equity-based pay held are significant but much smaller

[62] A t-test of group means confirms this assertion. Please see the description of summary statistics contained on pages 13 and 14 of Section 4 of this paper for information on the differences between adopting firms and non-adopting firms.

[63] Higher current pension liabilities reflect higher fixed contribution obligations to DB plans, since DC plans don't impose liabilities on the firm. This notion, combined with the higher incidence of DB plans for the adopter subsample indicates that these firms are burdened heavily with high amounts of fixed DB contribution requirements each year. The burden takes a toll on these firms' operating flexibility, so they are precisely the type of firm that could benefit most from a DC plan's contribution flexibility.

[64] The mean current liability for all sample firms equals $422,052,200, so I use this as the cutoff value. I classify firms with current pension liabilities less than or equal to $422,000,000 as low liability or low-burdened firms, and firms with pension liabilities greater than $422,000,000 as high liability or highly-burdened firms.

in magnitude in Panel B compared to Panel A. These results support the assertion that firms with higher current pension burdens drive the empirical results of this paper.

6 What types of firms drive the result?

Overall, results thus far point strongly to a link between executive compensation and pension choice. Firms using higher proportions of equity to compensate executives are more likely to adopt a DC plan. It is useful to understand what types of firms drive the relation between pension choice and executive compensation. First, I collect information on the governance aspects of the sample firms to understand how managerial power factors into the tension between pension choice and executive compensation, and I also use this information to uncover which party within the firm exploits the tension between rank-and-file pension plans and managerial pay. Next, I examine the innovation levels of sample firms in an effort to understand whether firms with volatility driven by "good" vs. "bad" sources are more likely to influence take advantage of the reduced risk of DC plans.

6.1 Are the results driven by strongly- or weakly-governed firms?

Until now, I have conducted analyses built on an economic story without making an explicit statement about the party exploiting the tension between executive equity compensation and rank-and-file employee pension plans. Two groups possess the power and motives to influence the choice: directors and executives. Directors occupy positions on the executive compensation committee, and one of their primary roles is to construct managerial pay to optimize firm performance, shape incentives and achieve governance goals in the interests of shareholders (Jensen and Meckling, 1976). Executives can demand certain types of compensation tools, and exert influence on their compensation design based on the power inherent in their position, their level of managerial ownership and the organizational structure of the board of directors (Bebchuk, et al., 2004; Bebchuk and Fried, 2004; Ferris et al., 2006; Bertrand and Mullainathan, 2001; Yermack, 1997; Blanchard et al., 1994). I use the Bebchuk-Cohen-Ferrell "Entrenchment Index" (E-index) as a measure of firm governance. This index is composed of the sum of

indicator variables signaling the existence of four provisions limiting shareholder power and two takeover impediment provisions, which proxies for managerial power.[65] Firms with high E-index values are weakly governed, since their managers are more entrenched, and firms with low E-index values are strongly governed, since their managers are less entrenched.[66]

I partition the sample based into two subsamples: above-average E-index firms and below-average E-index firms.[67] If executives in firms with weak corporate governance exert influence on the managerial compensation design to their advantage, then it is possible they may impact other firm decisions to increase the value of their compensation. If this is the case, firms with more entrenched managers should drive the relation between executive equity-based pay and the firm's decision to adopt a DC plan, and it would seem that incentives are playing a major role in the tension between executive and non-executive compensation. If, on the other hand, boards consider their executive compensation designs when making pension plan choices in an effort to optimize firm performance and with the ultimate goal of shareholder wealth maximization in mind, I expect the low E-index firms to drive the results seen in this paper. In this case, it would seem that the boards are considering the payoffs that executives receive from their own compensation schemes when shaping the compensation schemes of an alternative group of employees. Using institutional ownership as an instrument presents problems because it is highly correlated with governance and managerial power, so I employ CEO tenure as the instrument for equity-based pay held. [68]

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[65] The four provisions that limit shareholder power consist of the following: staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers and supermajority requirements for charter amendments. Poison pills and golden parachutes comprise the takeover impediments. Bebchuk Cohen and Ferrell (2008) finds that these six provisions fully explain the negative relation between firm value and governance measures documented in prior literature.

[66] I am grateful to Dr. Lucien Bebchuk for making the data from Bebchuk, Cohen and Ferrell (2008) freely available on his website: http://www.law.harvard.edu/faculty/bebchuk/data.shtml.

[67] The average E-index value for my sample of firms is equal to 2.4. I use 2 as the cutoff value, where low E-index firms have an E-index less than or equal to 2, and high E-index firms have an E-index greater than 2.

[68] Executive risk-aversion serves as my secondary instrument. In the basic principal-agent model, an executive's optimal level of incentive-based pay declines as risk-aversion increases. Smith and Watts (1982) documents that executives become more risk-averse as they approach retirement, a phenomenon commonly referred to as the "horizon problem". The horizon problem occurs when a firm's investment horizon exceeds executive tenure, which leads a myopic manager to exchange current benefits at the cost of future profits, knowing that they will no longer be with the firm by the time their action's costs are realized (Smith and Watts, 1982; DeChow and Sloan, 1991; Cheng, 2004). Pay to performance contracts with vesting periods mitigate the horizon problem since it arises from timing differences between managerial actions and compensation rewards or punishment. DeChow and Sloan (1991) confirms the existence of the horizon problem with respect to R&D spending, and shows that firms mitigate such myopic behavior with stock and option grants. I use CEO tenure and the averaged tenure of top executives to proxy for risk-

Table 2.8 presents results of IV probit regressions modeling the decision to adopt a DC plan as a function of CEO and top executive equity-based compensation measures and control variables. Panel A contains estimates from the probit regressions with time fixed effects on the various measures of executive compensation composition for the subsample of low E-index firms, and Panel B presents results from the same regressions on the subsample of high E-index firms. Panel B's estimates reveal that a one-percent increase in the proportions of equity pay held and granted increase the likelihood of DC adoption by 26% and nearly 32%, respectively, in firms with high managerial power. Both of these marginal effects are positive and significant. In Panel A, there is no evidence of a significant relation between executive equity-based pay and pension choice in firms with low managerial power. Considering Panel A and Panel B together indicates that the firms driving the results of this paper are more weakly-governed firms with limited managerial power, suggesting that the firm's decision to shift risk from security holders to employees is driven by powerful managers acting in their best interests because of the incentives that equity pay has created.

6.2 Are the results driven by firms with "good" or "bad" sources of volatility?

The rationale behind the equity-value hypothesis assumes that firms adopt DC plans to lower cash flow volatility because doing so reduces the firm's probability of bankruptcy and thus potential costs of financial distress. This assumption is largely supported in the corporate finance literature, but recent research shows that desirable firm characteristics can drive idiosyncratic volatility just as undesirable firm characteristics can. Innovation is one such example. Innovative firms have riskier fundamentals because innovating involves exploratory efforts with unsure payoffs, but undertaking such efforts improves the firm's long-term outlook. Specifically, more innovative firms have higher idiosyncratic volatility, but since innovation garners growth opportunities and better positions firms to take advantage of these

aversion in unreported regressions to ensure robustness. Gibbons and Murphy (1992) finds evidence that the pay-for-performance sensitivity of an executive is positively related to their tenure, and Graham, Harvey and Puri (2010) documents that more risk-averse CEOs are less likely to receive performance-based pay using a novel measure of manager risk-aversion based on results from executive psychometric tests. Hill and Phan (1991) and Agrawal and Knoeber (1996) also find that longer-tenured executives are driven by risk-aversion to prefer less equity compensation and more cash, citing the fact that executives with longer tenures are more likely to hold substantial equity shares from previous equity grants.

opportunities, innovation drives risk in a value-added manner (Bartram, et al., 2012).[69] Given that cash flow volatility is highly correlated with idiosyncratic volatility,[70] investigating whether firms with innovation-driven risk strongly influence the positive relation between equity pay and DC adoption provides a further mechanism for understanding the results of this paper. Firms with risk that is attributed to "good" sources of variability such as innovation should be less likely to benefit from DC adoption than firms that are fundamentally risky because these firms may not actively seek to lower their volatility through pension choice. In contrast, firms with volatility not driven by "good" risk sources stand to benefit from reducing risk, so these firms should be more likely to drive the equity-pay pension choice relation.

I use the ratio of research and development expense to total assets to proxy for firm innovation, following Bartram, Brown and Stulz (2012). I divide the entire sample of firms based on annual R&D expense scaled by total assets, using the average of all sample firm-year observations as the cutoff and present results from instrumental variable regressions in Table 2.9. Comparing Panel A to Panel B reveals that the positive relation between a CEO's equity-based pay and the decision to adopt a DC plan is driven mainly by those firms with lower spending on innovation. For a marginal increase in the proportion of equity held by the chief executive and top executives, the firm's probability of DC adoption rises by around 8% and 32%. Estimates from the regressions performed on the subsample of firms with above-average R&D spending reveal that DC adoption is neither encouraged nor discouraged in firms with higher levels of executive equity-based pay. Taken together, these estimates support the assertion that firms with uncertainty-driven risk primarily contribute to the positive relation between equity-based pay for executives and pension choice.

[69] As Bartram, Brown and Stulz (2012) points out on page 4, Myers and Majluf (1984) , among others, implies that firms with more growth opportunities incur greater information asymmetries, which suggests that these firms have more volatile fundamentals and higher idiosyncratic risk.

[70] See Irvine and Pontiff (2008), Wei and Zhang (2006), or Cao, Simin and Zhao (2008) for more detail on the relation between cash flow volatility and idiosyncratic volatility.

7 Conclusion

Empirical researchers regard the pension choices of a firm as separate from other compensation choices, including the composition of executive compensation. I investigate the relation between compensation for executives and pension plan offering for rank and file employees within publicly-traded firms. Specifically, I focus on the role of equity-based pay for executives in the firm's decision to adopt a defined-contribution pension plan, using a panel dataset of publicly-traded firms from 1992-2007. I hypothesize that the degree to which a firm uses equity-based executive compensation for executives affects its pension choice because the adoption of a DC plan increases operating flexibility and lowers cash flow variability and the probability of firm distress. DC adoption increases firm value as a risk management tool in the spirit of Smith and Stulz (1985), ultimately benefiting those executives receiving equity compensation. An alternative hypothesis holds that risk reduction through a DC plan adoption may be discouraged by the use of executive equity compensation because executive stock option values decrease with risk. I show that executive compensation significantly affects the firm's pension choice decision, even after controlling for influences that traditionally affect a firm's pension offering. In conditional probit regressions, I find that firms with higher equity-based proportions of executive pay held are more likely to adopt a DC plan, while firms with higher proportions of equity-based pay held and higher proportions of options as compensation are less likely to adopt a DC plan. These results hold regardless of whether I measure executive compensation from the CEO's perspective or from the firm's top executives' perspectives, but the conflicting conclusions suggest endogeneity-bias.

I address endogeneity concerns by instrumenting for executive compensation with institutional ownership. I find continued support for the equity-value hypothesis in these IV approaches, as a 1% increase in the ratio of equity-based pay held by a CEO increases the likelihood of DC adoption by over 16%. The effect is even stronger for upper-level managers in aggregate. A 1% increase in the proportion of equity-based pay granted to top executives increases the probability of DC adoption by over 20%. The IV estimates do not support the risk-reduction hypothesis. I also find that firms with higher pension

liabilities strongly drive the positive relation between executive pay and pension choice and that firms with high managerial power and uncertainty-driven risk drive the results more strongly than their counterparts.

These results have important corporate finance implications. I document a connection between pension policy and executive pay methods and demonstrate that the compensation and incentive structure for one set of agents directly affects the compensation and incentive structure for another agent. Given this previously unexplored interaction, my study underscores the importance of re-examining the effect of incentive compensation. I also contribute to the growing literature on the interdependence between a firm's pension choices and overall financial policies to document how a firm's overall financial policies influence its pension choices.

Table 2.1 - Pension Plan Observations, By Year

This table shows the number of DB (second column) and DC (third column) plans sponsored by publicly-traded firms from 1992-2007. The fourth column identifies the number of newly-adopted plans by publicly-traded firms during the sample period, while the fifth column shows the number of these newly-adopted DC plans in firms currently sponsoring a DB plan as well. Panel A shows these summary statistics for plans maintained by publicly-traded firms while Panel B shows statistics for plans maintained by publicly-traded firms that satisfied all data requirements.

	Panel A: All private pension plans sponsored by publicly-traded firms				*Panel B: Private pension plans sponsored by publicly-traded firms in this study's sample*			
Year	DB plans	DC plans	New DC plans	New DC plans by firms with DB plans	DB plans	DC plans	New DC plans	New DC plans by firms with DB plans
1992	3,644	4,411	160	80	718	540	15	10
1993	3,520	4,433	122	28	1,305	1,251	31	6
1994	3,349	4,422	158	79	1,320	1,475	45	38
1995	3,195	4,485	139	109	1,271	1,512	78	62
1996	3,022	4,428	130	57	1,243	1,574	44	30
1997	2,788	4,184	113	92	1,174	1,492	35	34
1998	2,651	3,914	90	57	1,140	1,389	21	10
1999	1,462	3,923	116	46	988	1,566	36	32
2000	1,465	4,020	121	27	865	1,649	46	22
2001	1,901	4,950	83	33	1,129	1,978	31	24
2002	1,823	4,830	62	15	1,100	1,984	20	10
2003	1,732	4,525	40	17	1,071	1,957	13	6
2004	1,467	4,154	34	7	941	1,874	15	7
2005	1,574	4,183	33	13	1,029	1,950	12	2
2006	1,341	3,852	56	24	1,139	2,444	2	1
2007	1,340	3,783	40	13	1,201	2,783	5	0
Totals	36,274	68,497	1,497	697	17,634	27,418	449	294

Table 2.2 (Panel A) - Univariate Summary Statistics

This table provides summary statistics for sample firms. Panel A including firms that maintain a DB plan and adopted a DC plan and those firms with DB plans which did not adopt a DC plan. Panel B contains summary statistics comparing the sample firms in aggregate with both the universe of S&P 1500 firms in the Execucomp database using the executive compensation variables and then the universe of publicly-traded firms in the Compustat database. The sample years span from 1992-2007.

Panel A - Comparison of DC Adopting Firms vs. Non-DC Adopting Firms

	Adopting Firms				Non-Adopting Firms			
Variable	Count	Mean	Median	StDev	Count	Mean	Median	StDev
PropEqHeld (%)								
CEO	292	61.4	44.0	27.8	15,105	60.5	69.1	29.2
All	292	57.9	41.0	25.8	15,121	57.1	63.0	26.9
PropEqGranted (%)								
CEO	317	38.7	42.3	26.3	16,932	38.2	39.0	25.4
All	317	36.3	38.4	23.3	16,941	37.1	37.4	23.6
PropOptGranted (%)								
CEO	319	31.0	27.1	24.8	17,138	28.5	26.4	23.7
All	319	28.6	28.0	21.5	17,147	26.6	24.4	20.4
Discretionary accruals (%)	427	18.5	20.0	12.9	25,989	17.6	18.0	18.8
NI growth/employee (%/emp)	441	0.0	0.0	0.1	27,162	0.0	0.1	0.7
Coll. bargaining dummy (%)	839	86.7			43,396	79.9		
Cash flow stdev ($)	505	266.4	22.4	1306.1	27,384	189.7	25.1	1161.3
Marginal tax rate (%)	491	31.4	34.0	6.9	29,301	30.5	34.0	7.5
Sales ($)	442	6247.1	2201.2	14458.3	27,617	6292.7	1676.8	15635.7
Market-to-book	443	1.6	1.4	0.7	27,589	1.53	1.31	0.81
ROA (%)	436	14.4	15.0	6.9	27,392	13.0	13.0	7.8
Lagged stock return (%)	442	9.8	8.0	41.9	27,697	24.0	4.0	14.8
Cash flow ($)	296	462.5	137.0	806.4	16,151	618.1	98.6	2155.7

Table 2.2 (Panel B) - Univariate Summary Statistics

This table provides summary statistics for sample firms. Panel A includes firms that maintain a DB plan and adopted a DC plan and those firms with DB plans that did not adopt a DC plan. Panel B contains summary statistics comparing the sample firms in aggregate with both the universe of S&P 1,500 firms in the Execucomp database using the executive compensation variables and then the universe of publicly-traded firms in the Compustat database. The sample years span from 1992-2007.

Panel B - Comparison of Sample Firms vs. Universe Firms

	Sample Firms				Universe of Firms			
Variable	Count	Mean	Median	StDev	Count	Mean	Median	StDev
PropEqHeld (%)								
CEO	15,397	60.6	69.0	29.2	29,705	23.9	13.5	38.7
All	15,413	57.1	63.1	26.9	29,705	24.2	15.5	42.5
PropEqGrant (%)								
CEO	17,249	39.1	41.0	29.4	29,705	39.1	40.7	29.4
All	17,258	40.0	40.1	28.7	29,705	39.9	40.3	28.6
PropOptGranted (%)								
CEO	17,456	28.6	26.4	23.7	29,705	28.6	23.6	25.5
All	17,465	29.1	25.0	25.5	29,705	29.1	25.0	29.4
Discretionary accruals (%)	26,416	17.7	25.2	18.7	91,350	-7.6	12.1	74.1
NI growth/employee (%/emp)	27,602	0.0	0.1	0.7	80,498	0.2	0.1	1.0
Coll. bargaining dummy (%)	44,235	54.0						
Cash flow stdev ($)	31,888	190.9	25.1	1163.8	92,442	173.2	19.1	1256.7
Marginal tax rate (%)	29,792	30.6	34.0	7.5	113,330	21.9	26.0	12.1
Sales ($)	28,059	6291.9	1681.2	15617.9	100,606	1436.0	126.3	7341.3
Market-to-book	28,032	1.5	1.3	0.8	99,918	2.2	1.3	31.9
ROA (%)	27,828	13.0	13.3	7.8	82,558	3.9	0.3	1044.2
Lagged stock return (%)	28,138	23.7	3.0	14.7	103,711	13.4	0.0	93.2
Cash flow ($)	16,447	615.2	98.7	2139.1	51,647	135.8	2.3	1151.9

Table 2.3 (Panel A) - Effect of Executive Compensation on Defined Contribution Plan Adoption

This table displays results from probit regressions of the decision to adopt a DC pension plan on explanatory variables using a sample of publicly-traded firms from 1992-2007. The variables of interest represent the composition of CEO compensation (Panel A) and the composition of top executive compensation (Panel B) that is devoted to equity-based instruments. Marginal effects are listed below. P-values are listed below them in parentheses. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. All regressions include time fixed effects.

	Panel A: CEO Equity-based Compensation			
Model	(1)	(2)	(3)	(4)
PropEqHeld	0.010 **			0.016 ***
	(0.025)			(0.000)
PropEqGranted		-0.011 **		-0.019 ***
		(0.026)		(0.001)
PropOptGranted			-0.006	
			(0.244)	
Log(Accruals)	-0.001	-0.001	-0.001	-0.001
	(0.684)	(0.684)	(0.829)	(0.727)
Log(NIGrowth/Emp)	-0.001	-0.001	-0.001	-0.001
	(0.221)	(0.438)	(0.385)	(0.247)
CollectBarg	-0.003	-0.003	-0.003	-0.003
	(0.420)	(0.446)	(0.427)	(0.443)
Log(CFVariance)	0.002 **	0.002 **	0.002 **	0.002 **
	(0.033)	(0.019)	(0.023)	(0.025)
MargTaxRate	0.018	0.029	0.027	0.020
	(0.380)	(0.153)	(0.184)	(0.326)
Log(Sales)	-0.002	-0.001	-0.001	-0.001
	(0.270)	(0.677)	(0.562)	(0.407)
MktToBook	0.002	0.003 *	0.003	0.002
	(0.199)	(0.092)	(0.102)	(0.183)
Log(ROA)	-0.001	-0.007	-0.006	-0.004
	(0.950)	(0.752)	(0.798)	(0.884)
Liquidity	0.001	0.003	0.003	0.002
	(0.553)	(0.515)	(0.515)	(0.588)
StockReturn	0.003	0.003	0.003	0.003
	(0.317)	(0.328)	(0.318)	(0.347)
Chi-squared	179.55	179.47	175.84	192.02
Correctly predicted	98.2%	98.2%	98.1%	98.9%
Outcomes = 1	294	294	294	294
Outcomes = 0	15,132	15,132	15,132	15,132
# Obs	15,426	15,426	15,426	15,426
Pseudo R-squared	0.0643	0.0648	0.0630	0.0688

Table 2.3 (Panel B) - Effect of Executive Compensation on Defined Contribution Plan Adoption

This table displays results from probit regressions of the decision to adopt a DC pension plan on explanatory variables using a sample of publicly-traded firms from 1992-2007. The variables of interest represent the composition of CEO compensation (Panel A) and the composition of top executive compensation (Panel B) that is devoted to equity-based instruments. Marginal effects are listed below. P-values are listed below them in parentheses. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. All regressions include time fixed effects.

	Panel B: Total Executive Equity-based Compensation			
Model	(5)	(6)	(7)	(8)
PropEqHeld	0.011 **			0.023 ***
	(0.027)			(0.000)
PropEqGranted		-0.020 ***		-0.035 ***
		(0.000)		(0.000)
PropOptGranted			-0.009	
			(0.121)	
Log(Accruals)	-0.001	-0.001	-0.001	-0.001
	(0.663)	(0.955)	(0.853)	(0.755)
Log(NIGrowth/Emp)	-0.001	-0.001	-0.001	-0.001
	(0.210)	(0.503)	(0.417)	(0.222)
CollectBarg	-0.003	-0.003	-0.003	-0.003
	(0.411)	(0.432)	(0.416)	(0.390)
Log(CFVariance)	0.002 **	0.002 **	0.002 **	0.002 **
	(0.034)	(0.014)	(0.022)	(0.020)
MargTaxRate	0.018	0.033	0.028	0.021
	(0.388)	(0.107)	(0.168)	(0.300)
Log(Sales)	-0.002	-0.002	-0.001	-0.001
	(0.272)	(0.849)	(0.590)	(0.504)
MktToBook	0.002	0.003 *	0.003 *	0.002
	(0.215)	(0.057)	(0.090)	(0.152)
Log(ROA)	-0.002	-0.011	-0.007	-0.009
	(0.941)	(0.629)	(0.763)	(0.671)
Liquidity	0.002	0.003	0.003	0.003
	(0.544)	(0.474)	(0.500)	(0.525)
StockReturn	0.003	0.003	0.003	0.003
	(0.317)	(0.353)	(0.324)	(0.393)
Chi-squared	179.38	186.95	176.91	187.09
Correctly predicted	98.2%	98.0%	98.1%	98.9%
Outcomes = 1	294	294	294	294
Outcomes = 0	15,132	15,132	15,132	15,132
# Obs	15,426	15,426	15,426	15,426
Pseudo R-squared	0.0642	0.0670	0.0634	0.0670

Table 2.4 (Panel A) - Effect of Executive Compensation on Defined Contribution Plan Adoption after Addressing Endogeneity

This table displays results from instrumental variable probit regressions of the corporate decision to adopt a DC pension plan on explanatory variables. The variables of interest measure the composition of CEO compensation (Panel A) and the composition of top executive compensation (Panel B) that is devoted to equity-based instruments. The instruments used institutional holdings and the lagged proportion options granted as total pay. The sample period spans from 1992 - 2007, and is limited to publicly-traded firms. Marginal effects are presented, and their corresponding p-values are listed in parentheses below. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. First-stage regression estimates appear first, and the second-stage estimates are next to the first-stage results. All regressions include time fixed effects.

	Panel A: CEO Equity-based Compensation											
Model	(1)				(2)				(3)			
PropEqHeld	0.133	***										
	(0.000)											
PropEqGranted					0.183	***						
					(0.000)							
PropOptGranted											0.034	
											(0.340)	
Log(Accruals)	0.043	**	-0.035	**	0.044	***	-0.039	**	0.013		-0.019	
	(0.017)		(0.040)		(0.003)		(0.030)		(0.323)		(0.108)	
Log(NIGrowth/Emp)	-0.008	***	0.000		-0.005	***	0.000		-0.006	***	-0.001	
	(0.000)		(0.931)		(0.002)		(0.993)		(0.000)		(0.662)	
CollectBarg	-0.008		0.004		0.004		-0.001		-0.007		-0.002	
	(0.352)		(0.956)		(0.565)		(0.882)		(0.271)		(0.961)	
Log(CFVariance)	0.002	***	-0.001		0.009	***	-0.002		-0.007	***	-0.001	
	(0.000)		(0.693)		(0.000)		(0.238)		(0.000)		(0.477)	
MargTaxRate	0.614	***	0.051		0.291	***	0.085		0.281	***	0.077	*
	(0.000)		(0.517)		(0.000)		(0.282)		(0.000)		(0.097)	
Log(Sales)	0.058	***	-0.005		0.039	***	-0.005		0.028	***	0.002	
	(0.000)		(0.177)		(0.000)		(0.238)		(0.000)		(0.537)	
MktToBook	0.086	***	-0.007	*	0.039	***	-0.002		0.030	***	0.002	
	(0.000)		(0.095)		(0.000)		(0.481)		(0.000)		(0.488)	
Log(ROA)	-0.358	***	-0.030		-0.290	***	0.035		-0.204	***	0.013	
	(0.000)		(0.583)		(0.000)		(0.543)		(0.000)		(0.723)	
CF Liquidity	0.005	***	-0.002	**	0.001		-0.002		-0.001		-0.001	
	(0.003)		(0.043)		(0.358)		(0.132)		(0.897)		(0.420)	
StockReturn	0.006		0.008		-0.018	**	0.012		0.007		0.005	
	(0.493)		(0.296)		(0.010)		(0.117)		(0.917)		(0.267)	
InstHldng	0.350	***			0.265	***						
	(0.000)				(0.000)							
LaggedPropOptGranted									0.007	***		
									(0.000)			
Wald Chi-square	156.52				162.98				115.38			
P-value	(0.000)				(0.000)				(0.000)			
% Correctly predicted	97.89%				97.86%				98.08%			
Outcomes = 1	190				190				155			
Outcomes = 0	8,826				8,826				7,935			
# Obs	9,016				9,016				8,090			

Table 2.4 (Panel B) - Effect of Executive Compensation on Defined Contribution Plan Adoption after Addressing Endogeneity

This table displays results from instrumental variable probit regressions of the corporate decision to adopt a DC pension plan on explanatory variables. The variables of interest measure the composition of CEO compensation (Panel A) and the composition of top executive compensation (Panel B) that is devoted to equity-based instruments. The instruments used institutional holdings and the lagged proportion options granted as total pay. The sample period spans from 1992 - 2007, and is limited to publicly-traded firms. Marginal effects are presented, and their corresponding p-values are listed in parentheses below. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. First-stage regression estimates appear first, and the second-stage estimates are next to the first-stage results. All regressions include time fixed effects.

	Panel B: Top Executives Equity-based Compensation											
Model	(4)			(5)			(6)					
PropEqHeld	0.165	***										
	(0.000)											
PropEqGranted				0.223	***							
				(0.000)								
PropOptGranted										0.007		
										(0.365)		
Log(Accruals)	0.048	***	-0.039	**	0.041	***	-0.041	**	0.009		-0.020	
	(0.004)		(0.032)		(0.004)		(0.032)		(0.439)		(0.758)	
Log(NIGrowth/Emp)	-0.008	***	0.003		-0.003	**	-0.003		-0.001		-0.009	
	(0.000)		(0.849)		(0.046)		(0.880)		(0.251)		(0.179)	
CollectBarg	0.001		-0.001		-0.003		-0.001		-0.008		-0.004	
	(0.867)		(0.927)		(0.668)		(0.996)		(0.106)		(0.759)	
Log(CFVariance)	0.004	**	-0.001		0.007	***	-0.002		0.000		0.002	
	(0.010)		(0.499)		(0.000)		(0.263)		(0.983)		(0.884)	
MargTaxRate	0.626	***	0.037		0.291	***	0.082		0.131	***	0.089	**
	(0.000)		(0.670)		(0.000)		(0.334)		(0.000)		(0.042)	
Log(Sales)	0.049	***	-0.006		0.042	***	-0.007		0.019	***	0.001	**
	(0.000)		(0.177)		(0.000)		(0.132)		(0.000)		(0.042)	
MktToBook	0.090	***	-0.010	**	0.048	***	-0.006		0.020	***	0.002	
	(0.000)		(0.041)		(0.000)		(0.153)		(0.000)		(0.982)	
Log(ROA)	-0.294	***	0.030		-0.292	***	0.045		-0.134	***	-0.005	
	(0.000)		(0.603)		(0.000)		(0.455)		(0.000)		(0.700)	
CF Liquidity	0.005	***	-0.002	**	0.002	**	-0.002	*	0.002	***	-0.001	**
	(0.000)		(0.039)		(0.016)		(0.070)		(0.002)		(0.015)	
StockReturn	0.008	***	0.008		-0.023	***	0.015	*	0.017	***	0.006	**
	(0.000)		(0.329)		(0.000)		(0.085)		(0.001)		(0.015)	
InstHldng	0.298	***			0.228	***						
	(0.000)				(0.000)							
									0.528	***		
LaggedPropOptGranted									(0.000)			
Wald Chi-square			166.67				175.12				106.41	
P-value			(0.000)				(0.000)				(0.000)	
% Correctly predicted			97.88%				97.86%				98.08%	
Outcomes = 1			190				190				155	
Outcomes = 0			5,388				8,826				7,935	
# Obs			9,016				9,016				8,090	

Table 2.5 - Effect of Executive Compensation on Defined Benefit Plan Termination/Freeze after Addressing Endogeneity

This table displays results from IV probit regressions of the decision to adopt a DC pension plan on explanatory variables. The variables of interest measure the composition of CEO compensation (Panel A) and aggregated top executive compensation (Panel B) that is devoted to equity-based instruments. Institutional ownership instruments for the proportion of equity-based pay held and granted and the lagged proportion of options granted as compensation instruments for the ratio of options granted to total pay. Marginal effects are listed below. P-values are listed below them in parentheses. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. All regressions include time fixed effects.

	Panel A: CEO Equity-based Compensation						*Panel B: Total Executive Equity-based Compensation*					
Model	(1)		(2)		(3)		(4)		(5)		(6)	
PropEqHeld	0.314	***					0.364	***				
	(0.000)						(0.000)					
PropEqGranted			0.406	***					0.470	***		
			(0.000)						(0.000)			
PropOptGranted					0.408	***					0.444	***
					(0.000)						(0.000)	
Log(Accruals)	-0.055	*	-0.058	*	-0.047		-0.059	**	-0.059	**	-0.048	
	(0.066)		(0.052)		(0.114)		(0.048)		(0.047)		(0.110)	
Log(NIGrowth/Emp)	0.005	*	0.005		0.004		0.006	*	0.005		0.003	
	(0.098)		(0.110)		(0.182)		(0.074)		(0.153)		(0.279)	
CollectBarg	0.068	***	0.063	***	0.066	***	0.064	***	0.065	***	0.069	***
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Log(CFVariance)	-0.008	***	-0.011	***	-0.009	***	-0.010	***	-0.011	***	-0.009	***
	(0.005)		(0.000)		(0.002)		(0.002)		(0.000)		(0.002)	
MargTaxRate	-0.744	***	-0.655	***	-0.626	***	-0.775	***	-0.670	***	-0.635	***
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Log(Sales)	0.042	***	0.044	***	0.047	***	0.042	***	0.040	***	0.048	***
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
MktToBook	-0.059	***	-0.048	***	-0.048	***	-0.064	***	-0.054	***	-0.052	***
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Log(ROA)	-0.160		-0.150		-0.167	*	-0.159		-0.127		-0.177	*
	(0.110)		(0.133)		(0.091)		(0.112)		(0.211)		(0.071)	
Liquidity	-0.003		-0.002		-0.002		-0.003		-0.003		-0.002	
	(0.116)		(0.319)		(0.348)		(0.104)		(0.165)		(0.235)	
StockReturn	0.012		0.021		0.017		0.011		0.024	*	0.019	
	(0.368)		(0.108)		(0.191)		(0.430)		(0.065)		(0.151)	
Chi-squared	700.88		752.12		705.08		712.84		730.85		699.45	
% correctly predicted	70.45		70.56		70.49		69.98		70.46		70.92	
Outcomes = 1	2,713		2,713		2,713		2,713		2,713		2,713	
Outcomes = 0	6,872		6,872		6,872		6,872		6,872		6,872	
# Obs	9,585		9,585		9,585		9,585		9,585		9,585	

Table 2.6 - Annual Pension Plan Statistics, Aggregated at Firm Level

This table contains descriptive statistics of participation and financial information for all the pension plans that the sample of publicly-traded firms sponsored, aggregated at the firm level each year. Pension plan information was obtained from Boston College's Center for Retirement Research collection of Form 5500 data, and pension plans were matched to their publicly-traded sponsors using the IRS Employer Identification Number (EIN). All dollar-value numbers are in thousands. There are 697 defined contribution plan adoptions, and there are 17,634 non-adoptions. The sample period spans from 1992-2007.

	Panel A: Firms adopting a DC plan		*Panel B: Firms not adopting DC plan*	
Pension statistic	Mean	StDev	Mean	StDev
Total # of plans	9.25	9.17	6.96	9.09
Total # of DB plans	5.71	6.10	4.80	7.38
Total # of DC plans	3.54	3.71	2.16	3.13
Total participant accounts	2,335,525	4,937,018	2,007,089	4,301,573
Total participant accounts with balances	1,233,959	3,480,729	1,205,272	7,382,229
Total participants receiving benefits	8,289,011	2,391,806	10,042,454	391,689
Current pension assets ($)	91,900	279,000	97,800	631,000
Current pension liabilities ($)	56,400	169,000	41,900	248,000
Current liabilities, given high interest rate ($)	69,900	237,000	57,200	275,000
Expected rise in current pension liabilities ($)	1,440	4,260	1,230	605
Increase in current pension liabilities ($)	262	1,250	467	2,470
Total employer pension contributions ($)	3,270	17,800	2,210	19,700
Total employee pension contributions ($)	16	211	26	297
Pension aggregate proceeds ($)	35,000	239,000	23,000	247,000
Pension aggregate costs ($)	34,300	233,000	22,400	243,000
Total pension income ($)	25,800	75,200	21,200	82,100
Total pension benefit payments ($)	10,200	30,200	11,111	36,400
Pension expenses ($)	10,600	30,700	11,500	37,500
Pension net income ($)	15,200	49,200	9,710	60,300

Table 2.7 - Effect of Executive Compensation on Defined Contribution Plan Adoption after Addressing Endogeneity - Subsamples based on Pension Liability Levels

This table displays results from IV probit regressions of the decision to adopt a DC pension plan on explanatory variables. The variables of interest appear first, and they measure the composition of CEO compensation (Columns 1 and 3) and aggregated top executive compensation (Columns 2 and 4) that is devoted to equity-based instruments. Institutional ownership instruments for the proportion of equity-based pay held. The subsample in Panel A consists of firms with above-average current pension liability levels and the subsample in Panel B consists of firms with below-average current pension liability levels. Marginal effects are listed below. P-values are listed below them in parentheses. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. All regressions include time fixed effects.

	Panel A: Subsample of firms with high current pension liabilities		*Panel B: Subsample of firms with low current pension liabilities*	
Model	(1)	(2)	(3)	(4)
PropEqHeld - CEO	0.200 ***		0.104 *	
	(0.002)		(0.051)	
PropEqHeld - AllExecs		0.305 ***		0.109 *
		(0.000)		(0.052)
Log(Accruals)	-0.036	-0.047	-0.064 **	-0.064 **
	(0.433)	(0.375)	(0.021)	(0.020)
Log(NIGrowth/Emp)	-0.010 ***	-0.011 **	0.007 ***	0.007 ***
	(0.008)	(0.020)	(0.004)	(0.004)
CollectBarg	-0.004	-0.007	0.014	0.013
	(0.727)	(0.586)	(0.539)	(0.547)
Log(CFVariance)	0.003	-0.001	-0.002	-0.002
	(0.902)	(0.749)	(0.482)	(0.443)
MargTaxRate	-0.010	-0.117	0.122	0.120
	(0.961)	(0.648)	(0.178)	(0.181)
Log(Sales)	-0.014 **	-0.016 ***	0.001 **	0.002
	(0.010)	(0.008)	(0.831)	(0.807)
MktToBook	-0.015 *	-0.027 **	-0.002	-0.002
	(0.063)	(0.014)	(0.759)	(0.731)
Log(ROA)	0.008	0.035	0.123 *	0.118
	(0.949)	(0.813)	(0.091)	(0.105)
Liquidity	-0.003	-0.001	-0.006 ***	-0.006 ***
	(0.815)	(0.691)	(0.001)	(0.002)
StockReturn	0.020	0.020	0.002	0.002
	(0.144)	(0.221)	(0.849)	(0.869)
Chi-squared	155.63	195.54	74.28	73.62
Correctly predicted	97.79%	97.96%	97.74%	97.73%
Outcomes = 1	114	114	76	76
Outcomes = 0	5,050	5,050	3,290	3,290
# Obs	5,164	5,164	3,366	3,366

Table 2.8 - Effect of Executive Compensation on Defined Contribution Plan Adoption after Addressing Endogeneity - Subsamples Based on Managerial Power Levels

This table displays results from IV probit regressions of the decision to adopt a DC pension plan on explanatory variables. The variables of interest measure the composition of CEO compensation (Columns 1 and 3) and aggregated top executive compensation (Columns 2 and 4) that is devoted to equity-based instruments. Executive tenure instruments for the proportion of equity-based pay held. Panel A consists of firms with low managerial power and Panel B consists of firms with high managerial power, proxied by the Entrenchment Index of Bebchuk, Cohen and Farrell (2009). Marginal effects are listed below. P-values are in parentheses. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. All regressions include time fixed effects.

	Panel A: Firms with Low Managerial Power				*Panel B: Firms with High Managerial Power*			
Model	(1)		(2)		(3)		(4)	
PropEqHeld - CEO	0.075				0.263	***		
	(0.143)				(0.000)			
PropEqHeld - AllExecs			0.097				0.319	***
			(0.136)				(0.000)	
Log(Accruals)	-0.067	**	-0.071	**	-0.078	*	-0.085	*
	(0.037)		(0.035)		(0.076)		(0.063)	
Log(NIGrowth/Emp)	-0.002		-0.002		0.002		0.002	
	(0.452)		(0.510)		(0.618)		(0.604)	
CollectBarg	0.005		0.005		-0.010		-0.013	
	(0.600)		(0.643)		(0.602)		(0.518)	
Log(CFVariance)	-0.002		-0.001		-0.001		-0.001	
	(0.897)		(0.676)		(0.778)		(0.847)	
MargTaxRate	0.670	**	0.677	**	-0.095		-0.106	
	(0.018)		(0.026)		(0.395)		(0.358)	
Log(Sales)	-0.003		-0.003		-0.012		-0.015	
	(0.518)		(0.594)		(0.154)		(0.101)	
MktToBook	-0.012	*	-0.014	*	-0.007		-0.010	
	(0.080)		(0.067)		(0.392)		(0.248)	
Log(ROA)	-0.080		-0.087		0.177	*	0.182	*
	(0.386)		(0.366)		(0.053)		(0.057)	
Liquidity	-0.010		-0.001		-0.006	***	-0.007	***
	(0.385)		(0.413)		(0.008)		(0.006)	
StockReturn	0.025	**	0.024	*	0.007		0.007	
	(0.046)		(0.066)		(0.635)		(0.626)	
Chi-squared	97.72		101.62		94.69		105.26	
Correctly predicted	97.54%		97.54%		97.42%		97.23%	
Outcomes = 1	106		106		84		84	
Outcomes = 0	4,197		4,197		3,594		3,594	
# Obs	4,303		4,303		3,678		3,678	

Table 2.9 - Effect of Executive Compensation on Defined Contribution Plan Adoption after Addressing Endogeneity - Subsamples Based on Innovation

This table displays results from IV probit regressions of the decision to adopt a DC pension plan on explanatory variables. The variables of interest measure the composition of CEO compensation (Columns 1 and 3) and aggregated top executive compensation (Columns 2 and 4) that is devoted to equity-based instruments. Institutional ownership instruments for the proportion of equity-based pay held. The subsample in Panel A consists of firms with low innovation and the subsample in Panel B consists of firms with high innovation as proxied by Research and Development spending scaled by total assets. Marginal effects are listed below. P-values are listed below them in parentheses. Statistical significance at the 10%, 5% and 1% level is denoted by (*), (**) and (***), respectively. All regressions include time fixed effects.

	Panel A: Firms with Low Innovation				*Panel B: Firms with High Innovation*			
Model	(1)		(2)		(3)		(4)	
PropEqHeld - CEO	0.083	***			0.096			
	(0.000)				(0.101)			
PropEqHeld - AllExecs			0.317	***			0.143	
			(0.000)				(0.182)	
Log(Accruals)	-0.363	*	-0.079	*	-0.020		-0.025	
	(0.075)		(0.079)		(0.324)		(0.271)	
Log(NIGrowth/Emp)	0.028	***	0.021	***	-0.005	**	-0.006	**
	(0.000)		(0.000)		(0.021)		(0.030)	
CollectBarg	-0.013		-0.022		0.008		0.008	
	(0.373)		(0.321)		(0.405)		(0.449)	
Log(CFVariance)	0.032	**	-0.012	***	0.001		0.001	
	(0.011)		(0.006)		(0.763)		(0.961)	
MargTaxRate	5.477		0.086		0.031		0.003	
	(0.540)		(0.596)		(0.786)		(0.985)	
Log(Sales)	0.018	*	0.021	**	-0.010	*	-0.012	**
	(0.069)		(0.046)		(0.055)		(0.041)	
MktToBook	-0.045	*	-0.021	*	-0.004		-0.008	
	(0.074)		(0.073)		(0.465)		(0.296)	
Log(ROA)	-0.139		0.138		-0.006		-0.001	
	(0.239)		(0.297)		(0.926)		(0.987)	
Liquidity	-0.001		-0.003		-0.003	**	-0.003	**
	(0.435)		(0.404)		(0.019)		(0.019)	
StockReturn	-0.220	***	-0.015		0.014		0.014	
	(0.435)		(0.417)		(0.132)		(0.197)	
Chi-squared	119.80		123.13		127.76		141.94	
Correctly predicted	97.14%		96.75%		97.66%		97.66%	
Outcomes = 1	57		57		133		133	
Outcomes = 0	2,710		2,710		5,560		5,560	
# Obs	2,767		2,767		5,693		5,693	

CHAPTER 3

CORPORATE PENSION PLAN PROVISION: PAST, PRESENT AND FUTURE

1 Introduction

Although they originated as a loyalty-based reward utilized by Emperor Augustus in Ancient Rome, pension plans are now used by nearly every publicly-traded firm in the United States. Alongside wages, bonuses and incentive pay tools, pension plans make up the chief methods through which employers pay employees. In 2010, employers in the U.S. paid nearly $784 billion in the form of retirement benefits, which amounted to about 10% of $7.9 trillion they paid in total in the form of employee compensation. The percentage of total compensation devoted to pension benefits has nearly quintupled since 1948,[71] and despite their relative importance, pension plan decisions and their effects on the firm receive less attention in the corporate finance literature than wages, bonuses and incentive pay.[72]

The basic rationale for maintaining pension scheme is simple enough: firms offer pensions to compensate workers for their efforts and remain competitive in the labor market. Every firm's aggregate pension scheme is, in part, influenced by firm-specific situational characteristics, but can the pension provision rationale be broken down and attributed to more specific, broadly-applicable motivations? Pension research suggests so, identifying five different motivations that lead firms to enact and maintain pensions. First, firms view pensions as a means to advance efficiency among workers. The sense of security that workers derive from retirement provisions encourages productivity and boosts morale. Similarly, formal pension plans allow firms to provide for older, less productive laborers while encouraging them to retire, which helps cull inefficiencies that result from employing suboptimal labor.

[71] In 1948, U.S. firms paid $3.1 billion in retirement benefits, which amounted to 2.2% of total compensation paid to employees. By 1955, 1965, 1975, 1985 and 1995, this percentage rose to 3.5%, 5.4%, 8.8%, 9.8%, and 9%, respectively. Source: Employee Benefits Research Institute (EBRI) Fast Facts Database (url: http://www.ebri.org/pdf/FFE112.27Jan09.Final.pdf).

[72] While the majority of papers in the employee compensation literature deal with executive compensation in general, salaries or wages and incentive pay through stock and option grants receive more attention than pensions. For example, searching the SSRN Financial Economic Network database for papers listing "wage" or "salary" as a primary subject yields 12,135 results, while a search for papers including "incentive pay" or "equity pay" returns 9,166 results. Only 3,445 results yield from a search on "pension" (excluding those results that pertain to public pension papers).

Second, pensions provide firms with valuable tax breaks, so they are a means for increasing firm earnings and maximizing a firm's value to its shareholders. Third, pensions permit firms to stabilize wages they offer to employees, especially when price or wage freezes limit the salaries they may offer. Fourth, labor unions exert power in many industries, and these bodies view pensions as a crucial component in the compensation scheme for their members. To the extent that firms wish to maintain successful negotiations with the unions their employees belong to, they must satisfy union demands for pension provision. Finally, even in the absence of labor unions, competitive labor markets mean that firms must offer pension plans as a business necessity.

Regardless of the motivations that lead firms to establish them, pension plans, once enacted, greatly affect their sponsors in a number of different ways. Prior to the 1970's, pensions were thought of as "off-balance sheet" entities that did not directly impact the firm, managed only for the benefit of the participants. We now know that a firm's market value fully incorporates not only the funding status of its pension plans (Oldfield, 1977; Feldstein and Seligman, 1983; Bodie et al., 1987; Bulow, Morck and Summers, 1987; Bodie and Papke, 1992), but also plan asset levels and liability levels (Feldstein and Morck, 1983; Landsman, 1986; Barth, 1991) as well as plan income and expenses (Barth et al., 1992; Rauh and Stefanescu, 2009). Pension plan risk matters as well, in that a firm's equity beta closely incorporates the risk of its pension plans (Jin et al., 2006). Firms gain from the tax advantages of their pension plans, and these tax benefits are significantly impacted by the asset allocation of its pension plans (Frank, 2002). Pension plans also affect a firm's ability to invest, so they directly influence a firm's capital budgeting agenda (Rauh, 2006). Additionally, pensions significantly influence firms' cost of capital, so they must be accounted for during capital structure decisions (Stefanescu and Shivdasani, 2010). Pension plans are even an earnings management vehicle, as managers may adjust the accounting assumptions they make when estimating a pension plan's value and liability, ultimately allowing them to affect the firm's bottom line (Bergstresser et al., 2006).

In this paper, I examine the origination and evolution of corporate pension plan provision in the United States. Understanding and continually reexamining all of the aspects of corporate finance provision is absolutely crucial for a number of reasons. First, the private pension marketplace is in constant flux, influenced by multiple aggregate trends at any point in time. Examining the causes and consequences of the trends of the past and current periods will likely enable prediction of future trends. Second, private pensions will be providing a larger share of retirement income for U.S. citizens than in the past given the precarious nature of the Social Security system in the U.S. As these vehicles become a larger and more important source of income for retirees, the importance of understanding all of the aspects that influence the private pension marketplace increases. Third, pensions are a highly influential source of capital. Invested funds from public or private pension plans are the world's largest aggregate source of capital, and pension capital in the U.S. is similarly significant. Accordingly, pensions are highly prominent to the world and domestic economy. Finally, because the characteristics of the pension plans a firm maintains affect that firm's market value and risk, pension plan policies are a crucial component of the corporate finance structure established by a firm. Since every pension decision that a publicly-traded firm makes has repercussions on that firm's owners, understanding of the drivers and results of multi-faceted pension schemes aids theories of the firm and expands upon knowledge of the wealth effects of corporate finance decisions. I contribute to financial literature with this paper in conducting an exhaustive review of the aspects of corporate pension provision because such a study has not been produced since 2010, to my knowledge.

The rest of this paper is as follows: Section 2 reviews the origins of employer-provided pensions, and Section 3 outlines the definitions and characteristics of the various types of pension plans that firms sponsor along with their corporate finance implications from the firm's perspective. Section 4 discusses the important acts of legislation that shaped and govern the private pension marketplace, while Section 5 presents employer-provided pension trends that demonstrably affected corporate pension plan provision. Section 6 hypothesizes the future issues that firms will likely find important with respect to pensions, and

Section 7, which concludes this essay, summarizes the main issues visited in the paper and presents an overall discussion of pension policies that flow naturally from these issues.

2 Origin of private pension marketplace

Pensions, which refer generally to payments provided to a worker after the fulfillment of duties or termination of working years, have a long and storied history. The first pension-like vehicles date back to the Roman Empire,[73] and throughout the development of history, nations, states, and municipalities have provided organized pension benefit plans to tenured public servants and members of the armed forces.[74] Colonial militias actually sponsored the first public pensions in what eventually became the United States, so these pension plans actually predate the nation's independence and the signing of the U.S. Constitution (McCourt, 2006). Despite their historically established presence in the public sector, employer-provided pension plans are a relatively new benefit scheme in private industries.

The first private pension plan enacted in the U.S. was established in 1875 by the American Express Company (Murray et al., 1932; Leo et al., 1997). The second was established five years later by the Baltimore and Ohio Railroad Company (Allen et al., 1997), and by 1899, thirteen firms maintained pension plans for their employees (Sass, 1997). Exponential growth followed soon after, as nearly 100 plans existed by 1910 (Leo et al., 1997). In the early 1900's, pension plans became more common in the banking, utility and railroad industries. Steel and oil firms soon joined the effort, as blue-chip corporations like Standard Oil Company of New Jersey, Carnegie Steel Company and United States Steel enacted three large and notable pension plans at the time (Leo et al., 1997). For the most part,

[73] Augustus established the first pension plan in 13 BC when he passed legislation promising veteran legionnaires pension benefits after they completed sixteen years in a legion and four years in Rome's military reserves. Augustus himself contributed large sums of money to the plan in its infancy, but later in 5 BC, legislators shifted the plan's funding efforts from employing Augustus' personal wealth and Roman revenues to a special source of revenue funded by a 5% inheritance tax and 1% tax on auction-generated transactions (an early type of sales tax). At the same time, plan trustees increased the minimum service requirements to twenty years in a legion and five years in a reserve unit. In exchange for their service, soldiers received an annuity equal to roughly 65-75% of a laborer's yearly earnings. This plan is the earliest known defined benefit pension plan (Craig, 2003).

[74] In 1592, British Parliament established military pensions for soldiers who were disabled in the service of the crown. The act granted twenty pounds to lieutenants and ten pounds to non-lieutenants, which actually amounted to a generous sum at the time. By the eighteenth century, Austria, France, Prussia and Spain provided pensions to members of the armed forces as well (Craig, 2003).

manufacturing firms didn't provide pension plans until the end of the First World War,[75] and this post-war growth in pension incidence was in part due to employers' new ability to purchase deferred annuities for their pensioners through insurance companies (Allen et al., 1997).

By 1929, pensions were a common component of total pay provided by mostly large employers, and a total of 397 private pension plans operated at the time, covering around 3.5 million workers in the U.S. (Leo et al., 1997). The economic turmoil leading up to and including the Great Depression in the 1930's and 1940's caused the collapse of some employer-provided pension plans, but many firms responded by downsizing contributions (Allen et al., 1997; Clarke et al., 2006). Despite the weakening effect of the Great Depression on the pension marketplace, the subsequent recovery eventually spurred the growth of the private pension marketplace. When the U.S. government responded to the Great Depression with increased spending, tax rates necessarily rose, particularly for corporations. Because pension contributions are tax deductible,[76] rising income tax rates greatly increased the appeal of providing pension for employees from the firm's perspective (Gale et al., 2004). At the same time, when the U.S. government enacted the Social Security system, laborers' demands for considerable retirement benefits from their employers lessened, allowing smaller firms to adopt pension plans and enabling larger firms already maintaining expensive pension plans to make more modest contributions (Craig, 2003). The growth of employer-provided pension plans significantly picked up after the Great Depression because of these conditions.

In 1940, private pension plans covered 4.1 million workers in the U.S, which amounted to around 10% of the non-agricultural labor pool (Leo et al., 1997). Four major factors fueled pension growth from the 1940's to the 1960's. First, even though firms maintaining select plans gained tax benefits from

[75] One reason why manufacturers formed pensions later than railroad, steel and banking companies is due to their relative age. Pension plans are most beneficial to established firms prone to the superannuation problem.

[76] Pensions first gained tax exemption in 1921, when the *Revenue Act* denoted profit-sharing trusts and stock bonus plans as tax exempt. In 1926, the *Revenue Act* of 1921 was amended to apply the tax exemption status to most pension plans, but it wasn't until the 1940's when the tax advantages that exist today came about. This act specified that pension plans must be "qualified" plans in order to gain tax exemption (Leo et al., 1997). Most employer-provided pension plans are "qualified" in the sense that they are designed to provide individuals and firms tax advantages that make them more desirable than regular individual retirement plans such as Roth IRAs. Exact tax benefits are plan-specific, but in general, employer and employee contributions made to the plan are tax-deductible. Because these plans provide tax benefits, they must meet certain statutory and regulatory requirements (dealing with coverage, disclosure, participation, vesting and nondiscrimination) designed to ensure that the plans and their beneficial tax status would apply to employees in the broad sense, and not just highly-paid individuals such as executives. Non-qualified plans are not eligible for beneficial tax treatment, so they are not subject to the same statutory and regulatory requirements. Contributions made to non-qualified plans are taxed when income is recognized.

pension contributions as early as 1921, the tax deductibility of pension plan contributions wasn't expanded and applied to pension trusts in the broad sense until 1942 (Leo et al., 1997). Second, the relatively high tax rates and financial prosperity that many firms experienced during the Second World War increased the attractiveness and ability of pension provision, respectively. Third, wage restrictions levied by the Wage Stabilization Board in the late 1940's and early 1950's meant that firms could only increase compensation to workers through fringe benefits like pension plans. Finally, a landmark decision in the Inland Steel Co. vs. NLRB officially classified pensions as wages, therefore cementing them as bargaining tools between firms and unions (Leo et al., 1997).

From 1955 to 1975, the number of qualified plans in existence grew at an average of 17% per year, increasing an average increase of 6% per year in employee coverage. During the same period, employer contributions grew by almost 11% per year, contributing to an annual increase in plan reserves averaging 13%. By 1970, 30.2 million U.S. workers qualified for pension coverage, up from 23.8 million in 1963 (Leo et al., 1977; Holland, 1966). When institutional use of pension plans expanded began expanding increasingly quickly, so did pressure for pension regulation, most notably resulting in the passage of the *Employee Retirement Income Security Act* (ERISA) in 1974.[77] Even increased regulation could not slow private pension provision. Since ERISA's passage, private pension plans incidence has exploded, resulting in retirement benefits coverage for nearly 75% of full-time private industry workers in the U.S. (Wiatrowski, 2011).

3 Pension plan types

There are two basic types of deferred compensation plans in the United States: defined benefit (DB) and defined contribution (DC). I define each major plan type in sections 3.1 and 3.2, and I detail the primary types of defined contribution plans and DB plans in sections 3.1.1-3.1.5 and 3.2.1-3.2.6, respectively. I discuss the important differences between these two traditional plan types in section 3.3. Hybrid plans, which are arrangements that have characteristics of both DB and defined contribution plans,

[77] I discuss ERISA and other notable pension legislation in Section 4.

are defined in section 3.4, and I discuss the primary hybrid pension plan arrangements in sections 3.4.1-3.4.6.

3.1 Definition and characteristics of defined benefit plans

Defined benefit plans specify future benefits provided to employees participating in the plan, where plan investment policy is controlled by the employer or an employer-appointed trustee or pension manager. Firms usually distribute DB benefits in the form of monthly values paid until the participant's death, beginning at the time of their retirements.[78] To finance these future liabilities, firms must pledge collateral, set aside the present value of future benefits as employees participate in the plan, or contribute periodically to accounts in order to build funds over time. The plan's liability grows over time, and firms bear the responsibility of ensuring that their plan's asset value adequately covers its promised benefits (Broadbent et al., 2006). [79] Common examples of DB plans include flat-benefit formula plans and unit-benefit formula plans.[80]

DB plans are required by law to be insured by the Pension Benefit Guaranty Corporation (PBGC), which is an independent federal government agency[81] established by ERISA to provide insurance protecting DB pension beneficiaries from sponsor or plan insolvency in certain situations. The PBGC steps in and assumes responsibility for the payment of pension benefits when a DB sponsor ends a

[78] Participants receive a monthly amount that is paid until the employee's death. It is based on a function of the participant's years of service with the firm, earnings history and age. Because benefits are owed until a participant's death, the firm is exposed to longevity risk, and as the lifespan of participants grows, the firm bears a more substantial burden than otherwise.

[79] Funding status refers to the value of plan assets with respect to the liability of the sponsor to the plan's beneficiaries. Plans with asset values less than their liability amounts are underfunded, and plans with asset values in excess of liability amounts are overfunded. When assets equal liabilities, plans are fully funded.

[80] Unit benefit plans specify an amount that is awarded per unit, where the unit of measurement is a year of service or employee type or salary range. In general, DB plans compute overall benefits according to a specific formula unique to each plan type, but those plans providing salary-based benefits per unit (for example, per year) so do according to each participant's terminal pay, final averaged pay or career-averaged pay. With a terminal pay formula, benefits are calculated based on the salary a participant earned in his or her final year of employment. With a final average pay formula, a participant's credit or percentage earned per year is based on an average of his or her final few salary amounts. These formulas ensure that a participant's ultimate aggregate pension benefit updates when the employee receives raises throughout his or her career. With a career average pay formula, participants receive benefits based on each year's actual salary or based on an average of their career salaries at certain points in time. In this respect, a participant's ultimate aggregate pension benefit will reflect the spread of salaries an employee was paid throughout his or her career.

[81] Although the PBGC can borrow limited amounts from the U.S. Treasury, it is a self-financed body and therefore does not receive tax revenue from the U.S. government or appropriations from Congress. Instead, insurance premiums, returns from invested income, assets of plans terminated under distress, and claims on the residual liabilities of the bankruptcy estates of firms undergoing distressed terminations. The organization's budget is, however, subject to approval as a governmental budgetary process of the federal government (McGill et al, 2010).

plan under distress.[82] When a plan is distressed, the value of the plan's current assets is less than the promised future benefits, and, more importantly, the continuation or standard termination of the plan would bankrupt the sponsor. Once distress has been demonstrated, the PBGC takes responsibility for a plan by assuming its assets, acting as plan trustee, and making efforts to collect underfunded amounts from the plan's sponsors (McGill et al., 2010). The plan is terminated, and participants receive an annual amount no greater than $55,840.92, usually in the form of an annuity.

A distress termination may also occur for plans sponsored by firms going bankrupt, and in this case, the PBGC becomes a junior creditor with a claim to recoveries of the sponsor's bankruptcy estates in addition to undertaking the actions described above. The PBGC may opt to terminate or take over a single-employer DB plan to protect its own interest or the interest of the plan's participants even if the sponsor does not seek to do so, and this process is referred to as an involuntary termination (McGill et al., 2010). Voluntary standard terminations are frequent in nature, and distressed terminations or involuntary terminations are very rare.

Pension sponsors pay the PBGC premiums based on the plan type, number of participants and degree of funding. In 1974, sponsors of single-employer plans[83] paid a flat-rate premium of $1.00 per participant and multi-employer plan sponsors paid $0.50 per participant. The PBGC's board of directors adjusted the premium amounts infrequently, resulting in only ten increases from 1974 to 2013.[84] In 1988, the PBGC introduced the variable-rate premium, costing firms $6.00 per $1,000.00 of unfunded plan liabilities in addition to the flat-rate premium, which had been increased to $2.20 per participant at the time. In 2000, single-employer plan sponsors paid $19.00 per participant and $9.00 per $1,000.00 of unfunded liability, while sponsors of multi-employer plans paid $2.60 per participant and the same variable-rate fee. In 2013, premiums for single-employer plans amount to $42.00 per participant in single-

[82] A voluntary standard termination occurs when a DB sponsor wishes to end a plan that is in proper financial health. These plans, which have current assets equal to (fully funded) or greater than (overfunded) the projected future benefits owed, may be liquidated and disbursed in orderly fashion. After the PBGC verifies the financial health of the plan and the plan for liquidation is carried out and lump sum payments or insurance annuities are provided to the participants, their guarantee ends.

[83] Multi-employer plans are maintained by a collection of sponsors and organized into common or master trusts.

[84] The adjustment years include 1977, 1985, 1987, 1990, 2005, 2006, 2007, 2008, 2009 and 2012.

employer plans and $12.00 per participant in multi-employer plans. The PBGC now charges a variable-rate premium of $9.00 per $1,000.00 of unfunded liability for both types of plans.

Although ERISA established the organization in September of 1974, the PBGC hit the ground running by taking over the first terminated plan and issuing its first pension check for $140.75 in 1975 to a participant in the International City Bank of New Orleans Employees Retirement Plan. From 1975 to 2010, the PBGC handled 3,995 distressed terminations, resulting in gross claims totaling to over $44 billion, which averages to 111 distressed terminations per year and a new gross claims load of around $1.2 billion per year. Standard terminations rose sharply to top over 170 terminations during the early 1990's, but the biggest spike occurred in the early 2000's, when termination rates reached nearly 190 per year. The number of distressed terminations fluctuated in the late 2000's between 110-172 plans.

Standard terminations, which do not require PBGC assistance apart from the organization's approval and assistance in the orderly ending of the plan, are far more common than distressed terminations. From 1975-2010, standard plan terminations averaged around 4,800 annually, but certain periods drove termination incidence more than others. Many firms chose to voluntarily close their DB plans during the late 1980's and early 1990's, when standard terminations rates per year topped 10,000 and almost reached 12,000. However, standard terminations slowed to around 3,500 in the late 1990's and eventually started to stagnate around 1,200 per year in the 2000's. [85]

PBGC coverage rates imply that the organization is an important risk-reduction fixture in the private pension marketplace. In 1987, PBGC insurance covered nearly 39.5 million pension participants in around 115,000 plans. The next year, the organization provided insurance for nearly 40 million participants in 110,000 DB plans, and in 1989, the PBGC protected the retirement assets of over 40 million participants in 105,000 plans. This pattern of annual increases in the number of participants and decreases in number of plans covered continued almost monotonically since the late 1980's until 2004,

[85] All termination numbers are available from the PBGC's database, obtained via the PBGC website (url: http://www.pbgc.gov/documents/1996databook.pdf).

when the number of PBGC-insured participants reached 44.5 million, in 38,000 plans. Today, the PBGC insures the assets nearly 45 million plan participants of just over 30,000 distinct plans, and currently pays benefits to nearly 750,000 retirees in around 4,000 distinct plans. [86]

3.1.1 Flat benefit amount plans

With flat benefit amount plans, employers promise to pay each participant a specified benefit amount that is unrelated to the employee's performance or tenure (Allen et al., 1997). This type of plan is very straightforward, and therefore quite simple to sponsor and maintain. It also treats all employees alike, no matter their rank or service length, so newly-formed firms wishing to reinforce uniformity among employees tend to offer these plans. However, because longer-tenured employees receive the same amount as brand new plan entrants in more established firms, these types of employers often combine flat amount plans with service- or age-based benefit plans.

3.1.2 Flat percentage of earnings plans

Under a flat percentage of earnings arrangement, employers promise benefits that are computed solely from each employee's pay (Allen et al., 1997). Since a participant's benefit is not influenced by his or her length of service, these plans provide a benefit proportional to each participant's earnings. This aspect makes them useful for providing pension benefits for a specific group of employees, such as clerical employees, or as the base formula for a multi-faceted DB plan for salaried employees.

According to the Bureau of Labor Statistics, 1% of employees participating in DB plans maintained by private industry firms gained benefits from a flat percentage of earnings plan in 2000.[87] This statistic totaled 8% and 6% just three and six years later, respectively.[88] In 2009, 6% of full-time

[86] All data on coverage and plan depth are available from the PBGC's database, obtained via the PBGC website (url: http://www.pbgc.gov/documents/1996databook.pdf).
[87] Source: Statistical Abstract of the United States, 2003: the National Data Book (url: http://www.lib.umich.edu/taubman/fulltext.html).
[88] Sources: Statistical Abstract of the United States, 2006: the National Data Book (url: http://www.lib.umich.edu/taubman/fulltext.html) and Census Bureau Compensation Tables (url: http://www.census.gov/compendia/statab/2012/tables/12s0553.pdf).

workers in private industry firms offering a DB plan were covered by plans with a flat percentage of earnings formula.[89] In 2010 and 2011, this figure fell to 3% and 2%, respectively.

3.1.3 Flat benefit amount per year of service plans

Participants in flat benefit amount per year of service plans earn a specified benefit amount per wholly completed year in their tenure. These plans provide higher benefit levels to longer-tenured employees, so they are useful for firms wishing to reward or encourage long tenure and discourage mobility (Allen et al., 1997).

In 2000 and 2003, 14% and 17% of full-time workers in private firms maintaining DB plans qualified for benefits based on a flat dollar amount per year formula, respectively.[90] By 2006 and 2009, this figure had risen to 18% and 24%, respectively.[91] Since DB plan incidence fell over this time period, it appears that firms terminated DB plans with flat benefit amount per year plans less often than other types of DB plans.

3.1.4 Percentage of employee earnings per year of service plans

Percentage of employee earnings per year of service plans provide benefits that are a percentage of each participant's total pay or salary multiplied by each year of complete service. Participants in flat percentage benefit amount per year of service plans earn this pre-specified percentage amount per wholly completed year in their tenure. These plans provide firms a way to reward different types of employees with different tenures in a comparable and equitable fashion, and because benefits are awarded to participants in relation to a 2-dimensional measure of their value or contribution to the firm, these are the most commonly-used DB pension plan (Allen et al., 1997).

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[89] Source: Census Bureau Compensation Tables (url: http://www.census.gov/compendia/statab/2012/tables/12s0553.pdf).
[90] Sources: Statistical Abstract of the United States, 2003: the National Data Book (url: http://www.lib.umich.edu/taubman/fulltext.html) and Statistical Abstract of the United States, 2006: the National Data Book (url: http://www.lib.umich.edu/taubman/fulltext.html).
[91] Source: Census Bureau Compensation Tables (url: http://www.census.gov/compendia/statab/2012/tables/12s0553.pdf).

In 2000, 61% of full-time workers in private firms with a DB plan qualified for benefits calculated based on a flat percentage of employee earnings formula.[92] This statistic fell to 53% in both 2003 and 2006.[93] In 2009, 46% of full-time employees in private industry firms maintaining a DB plan gained benefits from a plan employing the percentage of earnings approach.[94] These plans dominate the DB arena and are preferred by most private firms still maintaining a DB plan.

3.1.5 Variable benefit plans

Variable benefit plans are used by firms wishing to offer DB plans that protect pensioners' benefits from adverse inflationary effects. Accordingly, the benefits promised with these plans vary with a pre-specified index, such as a common cost-of-living index. Alternatively, employers can vary the benefits promised to reflect changes in the value of a specific portfolio of recognized investments like common stocks or combination of equity indices (Allen et al., 1997).

3.2 Definition and characteristics of defined contribution plans

With defined contribution plans, employers promise to make periodic contributions to each participant's account where the investment and payout policy is loosely controlled by the employee (Allen et al., 1997). Thus, in contrast to DB plans, firms maintaining DC plans simply contribute to participant accounts periodically, making no pledge about the value of future benefits. The amount an employee receives at retirement is a function of the contributions made and the investment earnings that accumulate in the account, and since plan participants are responsible for making investment decisions, they bear the risk of ensuring that their retirement funds do not lose value over time (Broadbent et al,

[92] This figure consisted of 48% of employees in firms with DB plans whose coverage was based on terminal earnings, while 13% was comprised of employees in firms with DB plans whose coverage was based on career-averaged earnings. Source: Statistical Abstract of the United States, 2003: the National Data Book (url: http://www.lib.umich.edu/taubman/fulltext.html).

[93] In 2003, 43% of full-time participants in private firm DB plans garnered benefits based on their terminal salaries, while 10% did so based on their career-averaged salaries. Source: Statistical Abstract of the United States, 2006: the National Data Book.(url: http://www.lib.umich.edu/taubman/fulltext.html). The 2006 statistic can be broken down as following: 39% of all full-time workers participated in DB plans with a fixed percentage of terminal earnings formula, while 14% participated in DB plans with a fixed percentage of career-averaged earnings formula. Source: Census Bureau Compensation Tables (url: http://www.census.gov/compendia/statab/2012/tables/12s0553.pdf).

[94] Thirty-five percent of all full-time workers participated in DB plans with a fixed percentage of terminal earnings formula, while 11% participated in DB plans with a fixed percentage of career-averaged earnings formula. Source: Census Bureau Compensation Tables (url: http://www.census.gov/compendia/statab/2012/tables/12s0553.pdf).

2006). Because the DC framework focuses on the value of assets currently in a participant's account, they are more straightforward, both from the provider's and the participant's perspective (Allen et al., 1997). They are also more flexible since contributions to DC plans are discretionary, for the most part. Finally, many DC plans allow for employee-matching, so participants can contribute alongside sponsors (Broadbent et al., 2006). Common examples of defined contribution plans include stock-purchase plans, profit-sharing plans, and 401(k)s.

3.2.1 Profit-sharing plan

In general, a profit-sharing plan is a voluntary qualified defined contribution pension benefit plan used by sponsors wishing to allow employees to earn a share in the profitability of the firm (Allen et al., 1997). In a profit-sharing plan, the employer makes regular contributions to a trust set up for this purpose, but depending upon the plan, there need not be a definite rule according to which the contributions are made. The contributions are only required to be "recurrent and substantial" for the plan to remain in good standing with the IRS, so the firm has some flexibility in designing contributions since this type of plan is usually based on the profitability of the firm (Allen et al., 1997)

Most firms base their contribution amounts explicitly upon the profit levels or expected profit levels of the current year, and the sponsor may change contribution amounts from year-to-year. Legally, the term "profit-sharing plan" is an umbrella term that applies in general to plans in which the firm may decide contribution levels based on the profitability of the firm. Inasmuch as other types of plans like thrift or savings plans adhere to this description, they are legally considered profit-sharing plans (Mitchell and Utkus, 2002). Profit-sharing plans are among the most popular type of DC plan because they are straightforward and flexible,[95] and because allowing employees to share in the earnings of the firm, albeit through pension contributions that employees won't collect until retirement, encourages them to contribute to the productivity and profitability of the firm. Additionally, since contributions are strictly

[95] Profit-sharing plans can be structured in a multitude of different ways, but there exist plain vanilla "pre-approved" versions that are available greatly reduces administrative costs for plan sponsors. Source: Internal Revenue Service Retirement Plan Description (url: http://www.irs.gov/Retirement-Plans/Choosing-a-Retirement-Plan:-Profit-Sharing-Plan).

discretionary,[96] firms can adjust their planned contributions with cash flow from year-to-year (Allen et al., 1997). Profit-sharing plans are not without downsides, however. Administrative costs soar as a profit-sharing plan structure becomes more complex, and employees are not allowed to contribute to their pension accounts under profit-sharing arrangements, by definition, so employers bear the responsibility of generating funds for participant accounts alone in these plans (McGill et al., 2010).

In 1985, 45%[97] of full-time workers in medium-to-large private firms participated in profit-sharing plans. In 1986 and 1987, this rate reached 50 and 53%, respectively. Since the late 1980's, participation rates fluctuated around 50%, falling to the lowest point of 42% in 1993 and reaching their peak of 54% in 1995. On average, nearly 360,000 profit-sharing plans were sponsored by private firms, and plan incidence rose each year from 1993-2010, for the most part. In 1993, 152,506 plans covered 22 million participants and garnered $66 billion in total contributions. By 2000, the number of plans more than doubled to 346,401. In these plans, nearly 39 million participants amassed $166 million in total contributions. In 2003, 49% of full-time workers in medium and large private firms participated in profit-sharing plans. In 2010, private firms contributed nearly $263 billion to over 500,000 plans covering 59 million participants.[98]

3.2.2 Employee stock ownership plan (ESOP)

Employee Stock Ownership Plans (ESOPs) are uniquely arranged defined contribution plans that require corporations to invest at least 50% of plan assets in employer securities. Legislators endorsed the ESOP structure to increase employee wealth in the form of own-company equity (Kelso and Adler, 1958) and broaden the stock ownership base to include workers (GAO, 1987). They are the only pension plan

[96] Contributions in 2012 could not exceed the lesser of 25% of compensation or $50,000. In 2013, they cannot exceed the lesser of 25% of compensation or $51,000.
[97] This participation rate includes profit-sharing and thrift plans, as this method is consistent with both the definition of profit-sharing plans and the treatment of such by the Internal Revenue Service data summary service and the Department of Labor data. (EBRI, 1997).
[98] Source: U.S. Department of Labor Form 5500 Historical Tables (url: http://www.dol.gov/ebsa/pdf/historicaltables.pdf).

exempt from diversification requirements.[99] ESOPs allow their sponsors considerable tax breaks that amount to as much as 0.3% of firm equity value depending upon the structure of the plan (Beatty, 1995; Gordon and Pound, 1990),[100] and they can be used to ward off unwanted takeover efforts since they necessarily place a large portion of own-company stock in friendly employee hands (Beatty, 1995; Rauh, 2006). Additionally, ESOPs align the interest of shareholders and employees, which reduces agency costs and encourages more efficient and effective performance (Conte et al., 1996; Park and Song, 1995; Chang, 1990). However, there are downsides to the ESOP's unique structure. ESOPs limit diversification efforts, require all eligible employees to participate, do not allow participants to determine how much to invest in the plan, and prevent participants from selling stock until they leave the firm or become fully vested. These qualities impose undue diversifiable risk onto participants, which destroys wealth and may induce them to demand a risk premium. They also involve high administrative costs and may expose sponsors to litigation risk when large losses in the price of the sponsoring firm's stock are sustained.

ESOP adoptions peaked during the 1970's and 1980's, but after their use stagnated in the 1990's, plan terminations quickly eclipsed adoptions. In 1985, ESOPs covered 24% of full-time employees in medium and large private firms. This figure reached 30% only one year later, but fell drastically by 1988 to reach only 2 percent. From 1988 to 2003, participation rates fluctuated around 2% (EBRI, 1997).

3.2.3 Employee stock purchase plan (ESPP)

An employee stock purchase plan (ESPP) is a benefit plan that allows employees to purchase company stock at a discount[101] with their own after-tax dollars, often through payroll deductions, generally over a three-month to twenty-seven month offering period. ESPPs appear almost exclusively in

[99] ERISA's diversification rule requires pension plan fiduciaries to diversify plan assets across investment type, geographic areas, business sectors and maturities to reduce the probability of large, correlated losses (Mitchell and Utkus, 2002). Accordingly, ERISA requires all defined benefit plans and most defined contribution plans to invest no more than 10% of fund assets in own-company investments, and provides diversification directions based on employee age. Because ESOPs are designed to invest principally in own-company stock, these requirements do not apply to them.

[100] Despite frequent changes to the tax code, ESOP tax breaks arise from three sources: partial deductibility of contributions, ESOP loan interest savings and tax deductibility of dividends paid on ESOP shares. Mitchell and Utkus (2002) estimate that the aggregate tax savings to U.S. firms provided by ESOPs amounted to $1.3 billion in 2002 alone.

[101] Babenko and Sen (2011) reports that firms in the S&P 500, NASDAQ 100 or S&P 400 midcap used a discount of approximately 13.8%-26.6%, on average.

public companies, and they allow participants freedom to access their shares any time once they become vested.[102] Firms that offer shares at a discounted price contribute the difference of the price at which the shares were obtained and the discount price at which they are offered to the employees.

With regards to the employer's tax liability generated at the time of the share award offer, ESPPs exist in both the qualified and non-qualified variety. Qualified ESPPs provide somewhat unique tax benefits,[103] but they also carry regulatory requirements that must be met for the sponsoring firm to receive the positive tax treatment.[104] Non-qualified ESPPs are not subject to the coverage, vesting, nondiscrimination, distribution and other requirements of plans covered above because they are not considered pension plans under ERISA. In both qualified and non-qualified ESPPs, the plans are typically designed "such that employees can elect to make deductions from their compensation and this deferral is then credited to an individual account where it is used to purchase stock (or stock options, in some cases)" (Huberman and Sengmueller, 2004).

ESPPs provide tax write-offs to their sponsors (Babenko and Sen, 2011) but these come at the cost of increased requirements and higher reporting and disclosure efforts despite their otherwise straightforward structure. They also allow firms to align the incentives of employees with that of shareholders, which reduces agency costs and encourages employees to improve performance and efficiency (Bhagat et al., 1984). Finally, ESPPs allow sponsors to enable or increase employee compensation using a method that may be partially funded by an increase in the firm's market price. The only downside, apart from reporting requirements, may arise if employees hold onto the shares for long periods of time, thus exposing themselves unduly to diversifiable risk. However, since most firms offering ESPPs allow participants to immediately sell the shares they've bought (Bebenko and Sen, 2011), participants are not barred from doing so and theoretically could not demand a risk premium from

[102] Employees who choose to sell their shares on the open market are subject to taxation of capital gains.

[103] The *Revenue Act of 1921* gave stock bonus plans and profit-sharing plans tax-favored status, so these general types of plans enjoyed tax advantages long before the birth of the ESOP as a qualified plan coded in ERISA (Blair, Kruse and Blasi, 2000). While the extent of the tax benefits available to sponsors of these plans doesn't seem to compare to the extent of ESOP-related tax benefits, the chronology is worth noting.

[104] ESPPs allow for contributions that do not exceed $25,000 annually or a specified percentage of annual salary, usually 10%, 15% or 20% (Babenko and Sen, 2011).

their employers. From 2002 to 2007, 34.6% of firms in the S&P 500, S&P 400 Midcap or NASDAQ 100 index maintained an ESPP.

3.2.4 Stock bonus plan

A stock bonus plan is a voluntary qualified DC pension benefit plan established and maintained by an employer that provides benefits similar to those of a profit-sharing plan, except that the benefits are designed to be distributed in the form of own-company stock (Huberman, 2003). In these plans, sponsors grant deposits of own-company stock into participating employee accounts based on the firm's earnings during that period (McGill et al., 2010). Because these plans enable employee ownership, they achieve incentive alignment and reduce agency costs in firms. Employee ownership also encourages employees to do their part to improve firm performance and efficiency, since they reap the benefits of such as stockholders. These plans are quite flexible, and they allow for employer matching in the form of contributions, but they do not require it. The only downsides to stock bonus plans include the reporting requirements and the possibility that participant retirement income may be exposed to costly diversifiable risk (McGill et al., 2010). However, since stock bonus plans are rarely seen as the only retirement vehicle, the latter downside is negligible for most private firms (Allen et al., 1997).

According to employee-ownership experts, stock bonus plans predate all other types of employee-ownership benefit plans and remain the oldest type of plan still used in modern corporations (Berle and Means, 1991). Despite this, their use is relatively uncommon. From 1986 to 1993, less than 0.5% of full-time workers in large and medium-sized private firms participated in stock bonus plans. Private firms in the U.S. sponsored 307 plans, on average, from 1993 to 2010. In 1993, 84 plans covered 221,000 participants and gained $868 million in contributions. Plan participation peaked in 1995, when 2% of full-time workers in medium and large private firms participated in stock bonus plans. This statistic fell to 1% two years later. Plan usage peaked in 1997, when private firms sponsored 614 plans and contributed over $4 billion in pension funds to 997,000 active participants. Since 1997, however,

participation rates have remained less than 0.5% of full-time employees in private medium-to-large-sized firms (EBRI, 1997). By 2005, plan incidence decreased to 272, covering 696,000 active participants and gaining $3 billion in total contributions that year. In 2010, private firms contributed nearly $3 billion to around 471,000 participants in 433 plans.[105]

3.2.5 401(k) plan

A 401(k) plan, which is also known as a cash or deferred arrangement (CODA), is a qualified type of profit-sharing or stock bonus plan that allows employees to receive employer payments either in cash or as contributions to the plan. Employees can voluntarily participate in these DC plans by arranging for their employers to reduce their regular compensation by an amount that will be contributed to their 401(k) account (McGill et al., 2010). This is known as an elective contribution (Huberman, 2003). An employer can, and most often does, match employee contributions by contributing the same amount of money as each employee, in the form of stock or cash,[106] but plan sponsors can adjust matching behavior from year to year to maintain contribution flexibility (Allen et al., 1997).

Apart from their contribution flexibility, sponsors find these plans advantageous because the 401(k) structure allows employees to be major contributors to their retirement accounts, and employees value the flexibility in setting deferrals and choosing asset allocation (Allen et al., 1997). Perhaps more significantly, 401(k)s are unique in that they allow employees to deduct their contributions. While all employer contributions made to qualified plans are tax-deductible up to a certain amount, only CODAs provide tax shields to employees who contribute to their retirement accounts (Gale et al., 2004). In this respect, 401(k) plans minimize pressure for additional compensation (Leo et al., 1997). The downsides to 401(k) plans are significant, in many cases, however. First, 401(k) regulations and requirements are complex, which results in costly compliance efforts, especially for smaller firms (Leo et al., 1997).

[105] Source: U.S. Department of Labor Form 5500 Historical Tables (url: http://www.dol.gov/ebsa/pdf/historicaltables.pdf).

[106] Holden and Vanderhei (2001) report that over 90% of employers in the United States match contributions. Mitchell and Utkus (2002) reports that the most common matching scheme observed in 401(k) plans in the U.S. is $0.50 per employee dollar, up to 6% of pay.

Second, inasmuch as the employer provides asset allocation choices to the employees, they must provide at least a minimum level of education to these participants, so communication costs result. Third, the threat of litigation risk due to a decrease in stock prices is highest with 401(k) provision,[107] so sponsors of these plans face litigation risk and increased pension insurance costs (Martin and Fine, 2004; Cole and Fier, 2011).[108]

These plans have become increasingly popular at publicly-traded workplaces in the U.S. since their inception in 1981, when Johnson Companies designed the first 401(k) arrangement.[109] 401(k) plans are the dominant form of DC plan offered by United States employers. Department of Labor data indicates that the number of 401(k) plans per year grew at an average annual rate of 16% from 1984-2008 while the number of active participants per year grew at an average annual rate of 9% for the same period. Compared to the increased incidence of most types of pension plans, 401(k) plan use grew with astounding speed. In 1984, private firms sponsored over 17,000 401(k) plans, which covered around 8 million participants with plan contributions totaling to over $16 billion.

Plan incidence, number of participants, and total plan assets increased at astonishing rates, especially since 1984. By 1990, there were more than 97,000 plans covering nearly 20 million participants, and firms contributed nearly $50 billion in total to individual accounts in these plans. By 1995, the number of plans sponsored by private firms doubled to reach more than 200,000, and firms contributed over $87 billion to the accounts of around 27 million active participants. By 2000, almost 350,000 plans covered nearly 40 million participants and held almost $169 billion in contributions from

[107] Stock-drop litigation is brought when a firm's stock price falls, which triggers a significant loss in retirement funds invested in own-company shares, either through an ESOP or another employee ownership plan. Plaintiffs allege that the firm's officers, who are also plan fiduciaries, did not undertake their fiduciary duty to disclose certain material information about the firm to the plan to allow the plan to avoid imprudent investing in own-company stock. A cursory glance at some of the public companies that were parties in these stock-drop lawsuits indicates that a good number of them appear in my sample. Examples include GM, Enron, Royal Dutch Shell, Honeywell, Textron, McKesson, Sears Roebuck, Fifth Third Bancorp, Polaroid, Keycorp, Medtronic, McDonnell Douglas, WR Grace, Reynolds, EDS, Morrison Knudson, Corning, and International Paper.

[108] "Because of the potential size of these lawsuits, even when cases are settled prior to going to trial, the cost of litigation can be significant with settlements in the range of millions of dollars (Sharma, 2007). For example, in 2005, Honeywell settled with plan participants for a total of $14 million in cash. In 2007, Krispy Kreme Doughnuts settled its stock-drop suit for a total of $8.27 million."

[109] Source: EBRI Facts "History of 401(k) Plans: An Update." (url: http://www.ebri.org/pdf/publications/facts/0205fact.a.pdf).

that year alone. Ten years later, over 60 million employees in private firms belonged to almost 520,000 plans and total contributions topped out at nearly $270 billion.[110]

3.2.6 Money purchase plans

Money purchase plans are DC pension plans that have one characteristic that is usually seen only in DB plans: required employer contributions (McGill et al., 2010). With a money purchase plan, an employer promises to pay a fixed amount to each eligible employee's account each year, usually specified as a percentage of pay or as a flat dollar amount. These funds, along with fund that employees may choose to contribute,[111] are invested on the participant's behalf, just as in most DC plans (Allen et al., 1997). Unlike most DC plans, however, money purchase plans impose a commitment upon their sponsors, and these required contributions are invariable. Indeed, sponsors whose contributions do not reach plan minimums face an excise tax (McGill et al., 2010). This characteristic makes them unappealing to employers seeking to benefit from discretionary contributions, so money purchase plans are generally used in non-profit firms and as plans set up by self-employed individuals (Allen et al., 1997). Prior to 2010, money purchase plans offered a more desirable tax advantage than some other types of DC plans, as the maximum allowable deductible contribution limits were higher with these plans. This is no longer the case.[112]

In 1985, roughly 4% of full-time employees working in medium and large private firms participated in money purchase plan. One year later, participation rate fell to 2%. Private firms sponsored around 1,500 plans per year, on average, between 1993 and 2010, but their use trended downwards over the period. In 1994, 4,165 plans covered 369,000 active participants and garnered $684 million in total assets. By 1998, private firms sponsored 1,884 money purchase plans, in which 262,000 active participants amassed contributions equaling $717 million. In 2003, nearly 7% of full-time employees in

[110] Source: Department of Labor Form 5500 Historical Tables (url: http://www.dol.gov/ebsa/pdf/historicaltables.pdf).
[111] Depending on the plan's structure, employees may or may not be required to contribute to the plan. If this is a requirement, employees contributed a fixed amount or percentage of their after-tax income only.
[112] Contributions cannot exceed the lesser of 25% of compensation or $50,000 in 2012. In 2013, they cannot exceed the lesser of 25% of compensation or $51,000.

medium and large private firms belonged to a money purchase plan agreement, down from its peak of 8% in 1993.[113] By 2004, plan incidence decreased to 1,111, with 224,000 participants and $771 million in total contributions. Money purchase usage in 2010 decreased to 726 plans, with 300,000 participants and $927 million in contributions.[114]

3.3 Major differences between defined benefit and defined contribution plans

The various characteristics of DB plans and DC plans differ in many respects, and each type of plan offers advantages and disadvantages from the point of view of the sponsor. It is important to understand these differences, advantages and disadvantages, because they significantly drive pension provision trends, which I discuss in Section 5 of this paper.

First, because they represent promises of future benefits, traditional DB plans must be funded by the firm. Often, a firm has flexibility with respect to the funding arrangement it chooses to implement for a DB plan, but the fact that DB plans must be funded makes them less desirable when compared to DC plans. To finance future DB liabilities, firms pledge collateral, set aside the present value of future benefits as employees participate in the plan, or contribute periodically to accounts in order to build funds over time (Broadbent et al., 2006). The plan's liability grows over time, and firms bear the responsibility of ensuring that their plan's asset value adequately covers its promised benefits,[115] a process requiring periodic actuarial valuation. This task is complex because it involves making assumptions about inflation, investment returns, and the life expectancies of participants, and research shows that firm sponsors can adjust these assumptions to manage firm earnings and income levels (Weidman and Goldberg, 2002, Coronado and Sharpe, 2003 and Bergstresser, Desai and Rauh, 2006). With DC plans, firms only promise to make current contributions rather than provide future benefits, so DC plans are always exactly funded

[113] Source: EBRI Databook. (url: http://www.ebri.org/pdf/publications/books/databook/DB.Chapter%2010.pdf).
[114] Source: Department of Labor Form 5500 Historical Tables (url: http://www.dol.gov/ebsa/pdf/historicaltables.pdf).
[115] Comparing the present value of the promised future benefits to the amount of funds currently in a pension plan's asset column reveals the dress of funding. Funding status refers to the value of plan assets with respect to the liability of the sponsor to the plan's beneficiaries. Plans with asset values less than their liability amounts are underfunded, and plans with asset values in excess of liability amounts are overfunded. When assets equal liabilities, plans are fully funded.

by definition. The DC framework focuses on the value of assets currently in a participant's account rather than the estimated value of assets in the future based on complex earning power and investment allocation assumptions, so actuarial valuation is not required (Gale et al., 1997; Allen et al., 1997). Accordingly, most DC plans are less demanding than DB plans from the administrative and accounting perspective of a plan sponsor. Plan funding is also related to insurance coverage as an important measure of the health of a pension plan. Firms must pay the PBGC to provide insurance coverage for DB plans, while no such requirement exists for DC plans. While insurance coverage transfers some risk from the sponsor to the PBGC, it does come at a cost, and it does result in additional administrative effort in the form of increased reporting and disclosure requirements.

Contribution flexibility provides another metric that highlights the differences between DB and DC plans. Sponsors of DB plans face rigid contribution schedules that are imposed by law to ensure that certain minimum funding requirements are fulfilled (Rauh, 2009). In this respect, sponsors view DB plan contributions as mandatory, as they must be made annually or periodically regardless of the firm's earnings and financial health. Despite the necessary nature of DB contributions, sponsors often find that projecting future DB pension contributions and costs is a complex and highly variable process because it requires sponsors to project the value of future plan assets in the near future (EBRI, 1996). As mentioned above, the inherent assumption making that this valuation process entails renders DB projections quite variable, which can impose further risk on the firm. Compared to DB plans, DC plans afford firms a large degree of flexibility because they allow the firm discretion in adjusting contribution levels from year to year.[116] This flexibility adds value to the firm because it lowers the firm's cash flow variability, operating flexibility and cost of capital (Petersen, 1996).[117] Many DC sponsors choose to allocate a percentage of earnings as pension contributions, which results in stable and predictable contributions (Allen et al.,

[116] In recent years, an increase in pension-related lawsuits has plagued firms offering DC plans, which is especially pronounced in firms with 401(k) plans. Since litigation risk does arise when a firm adopts a DC plan, they are not technically risk free. Regardless, they are far less risky to the firm than DB plans.

[117] Firms may temporarily store or remove internal funds in their pensions (Bodie, Light, Morck and Taggart, 1987), so flexibility in contributions serves to make a pension plan a form of internal slack (Ballester, Fried and Livnat, 2002) that firms adjust over time by manipulating pension policies in order to manage contribution volatility (Bader, 1991).

1997). This is in direct contrast to DB contributions, which, as mentioned above, are necessary and unpredictable. Another difference between DB and DC plans relating to contributions refers to the ability of the participants to make contributions to their own accounts (EBRI, 1996). Many DC structures allow employees to set aside monthly amounts for their retirement accounts or otherwise match employer contributions, but this is relatively unseen in any DB arrangement (EBRI, 1996).

Investment responsibilities lie with different parties in DB plans versus DC plans. With DB plans, a plan's liability belongs to the firm, and the firm bears the responsibility of ensuring that invested funds cover plan liabilities (Broadbent et al., 2006). Accordingly, the sponsor must decide on proper asset allocation techniques and investment decisions and bear the risk that is associated with investing funds. The amount an employee receives from a DC plan at retirement is a function of the contributions made and the investment earnings that accumulate in the account, and since plan participants are responsible for making investment decisions, they bear the risk of ensuring that their retirement funds do not lose value over time (Broadbent et al., 2006). Thus, the asset allocation choice, decision between back-loaded or front-loaded structure, and form of ultimate payout all lie with the participant rather than the employer with a DC plan (Allen et al., 1997).[118] While DC plans are advantageous because they place many pension-related responsibilities in the hands of participants, firms with these plans often take measures to ensure that their participants are educated about investment decisions, which requires effort and communication costs that may offset some of the benefits of shifting investment risk onto employees (Leo et al., 1997).

DC and DB plans also differ with respect to the type of incentives they create amongst employees. Most DB plans are back-loaded, meaning that longer-tenured employees tend to earn more benefits than shorter-tenured employees (Allen et al., 1997). Additionally, because the assets of a DB plan belong to the sponsor rather than the participant, employees with unvested benefits cannot take their

[118] According to ERISA, firms must provide a broad range of investment choices that span different asset types, geographies and risk profiles, but employees do not face limitless choices when allocating their pension investments.

retirement income if they vacate their current job, and those with vested benefits may only receive a portion of their promised retirement funds upon early termination. Accordingly, DB plans are non-transferrable encourage long tenure and discourage mobility (Bodie et al., 1985; Bader, 1995; Blake, 2005). DC plans, on the other hand, do not punish mobility (Broadbent et al., 2006). Under the DC arrangement, the assets in each participant's account belong to the participant, not the firm, so employees who do not stay with their current firm until retirement are not punished as long as they roll their DC assets into another retirement vehicle. DC plans are therefore ideal for mobile employees, and this aspect has been increasingly important as the mobility of the labor force has increased over time (Broadbent et al., 2006; Allen, et al., 1997).

Finally, most DC plans often have front-loaded vesting schedules, which allow younger or newer employees to earn more retirement benefits than they would in an identical DB plan, since DB plans tend to reward older and longer-tenured employees (Allen et al., 1997). Another aspect of employee behavior DB plans and DC plans affect differently is the ability to retire early. Some DB plans may be structured so that they still allow subsidized retirement benefits if participants retire early. In contrast, participants in DC plans that retire early forgo tax benefits and therefore forgo the boost in retirement income that comes from subsidization (Allen et al., 1997).

Inflation affects DB and DC plans differently. With DB plans, employers may have to increase benefit levels with unforeseeable levels of inflation, so the risk of uncertain purchasing power changes lies with sponsors of these structures. In contrast, sponsors of DC plans need not worry about inflation since these plans only promise current contributions rather than future benefits (Broadbent et al., 2006). Another risk that sets DB plans apart from DC plans is the risk that employees live longer lives than a plan has assumed. Since DB plans provide benefits from retirement to death, firms are exposed to the increased longevity risk associated with beneficiaries outliving the time period plan assumptions model. With DC plans, the retiree is exposed to longevity risk rather than the sponsor (Broadbent et al., 2006).

DB and DC plans also differ with respect to the use of own-company stock as pension assets. Some DC structures allow sponsoring employers to match contributions or provide pension funds in the form of employer stock, while DB plans discourage this practice.[119] Firms benefit from using employer stock as contributions, because this is a low-cost contribution method, can be used to thwart unwanted takeover attempts, effectively ties the payoffs of any employee to the performance of the firm, and induces mutual monitoring and coordination efforts among rank-and-file employees as well as increased effort to improve performance and firm efficiency (Beatty, 1994; Beatty, 1995; Rauh, 2006).

Social Security integration[120] is different in DB plans than it is in DC plans by legislative design. Employers take Social Security into account when they are designing employer-provided plans in order to achieve desired results for employees from both sources combined. While they can adjust integration with DC plans by adjusting contribution levels, DB plan integration is achieved far more efficiently, with less cost and effort required from the sponsor (Allen et al., 1997). Finally, the ability of DB sponsors to provide past service credits or above entry-level benefits to experienced employees who are new hires at their own firm but who are not starting out their careers makes DB plans more powerful for mid-level recruiting. DC plans do not allow for past service credits, so their sponsors may find difficulty in recruiting experienced employees based on pension benefits alone.

Overall, DB plans impose investment, longevity and inflation risk on their sponsors in addition to entailing rigid pension contribution limits and liabilities (Broadbent et al., 2006). PBGC support is available for sponsors of DB plans, at the cost of annual and per-participant premiums, and Social Security integration is more advanced for DB plans. However, they allow employers to encourage long tenure and more effectively recruit mid-level or older employees at the cost of offering lower benefits to younger or newer hires. Firms can actively cull their workforce of inefficient older employees by allotting

[119] All DB plans are required to have less than 10% of retirement assets as own-company stock, but most plans have no more than 2%, on average.

[120] According to EBRI (1996), "Integration is a feature of some qualified retirement plans that coordinates plan benefits or contributions with Social Security benefits. Social Security benefits are "progressive," i.e., they replace a greater proportion of preretirement earnings for lower earners than higher earners. To compensate for this benefit tilt, plans may provide proportionately (as a percentage of compensation) higher pension benefits or contributions to higher paid participants than to lower paid participants, subject to certain limits. Since passage of the Tax Reform Act of 1986, integration is referred to as permitted disparity."

for subsidized early retirement with DB plans, but the administration costs associated with these plans, which includes regulatory requirement compliance and actuarial valuation, are significant. Overall, DC plans shift investment, inflation and longevity risk from sponsors to participants, all while allowing flexibility in pension contribution levels without imposing a liability on the sponsoring firms (Broadbent et al., 2006). They do not punish mobility or offer smaller benefits to new hires or younger workers like DB plans, but DC plans do discourage early retirement by imposing fees and taxes on early-retirees. DC plan sponsors do not have the cost of PBGC insurance, but they also do not have support if plans fail, which is worrisome considering that most stock-drop pension-related litigation risk is borne by DC sponsors.

3.4 Definition and characteristics of hybrid plans

While many private employers continue to offer traditional DB and DC plans because of the different characteristics and benefits these plans offer, many firms have chosen to supplement their pension schemes with new or converted plans that are neither traditional DB nor traditional DC plans. These so-called hybrid plans combine features attributed to both DC and DB plans. In offering characteristics of both types of plans, hybrids allow employers to better manage the tradeoff between optimizing the firm's compensation package by providing appropriate retirement plans that accommodate the dynamic needs of an evolving workforce and allowing the organization to maintain financial health.

Hybrid structures allow for employer contributions and employee contributions, in some instances, and participation in these plans is usually mandatory. Sometimes, hybrids are covered by PBGC insurance, but more often than not, the employer and employee share some of the pension-related risks inherent in investing contributions until retirement.[121] Since hybrids often establish accounts for each participant, they do not punish mobility among employees, and since account balances are

[121] For example, hybrids with account balances that earn a guaranteed benchmarked annual rate of return (equal to the T-bill rate or LIBOR) are less risky to employees than traditional DC plans because the employee has less investment responsibility and exposure to market risk. The sponsor bears the risk of providing the guaranteed return, but because sponsors are allowed to change the benchmark within these structures, they are alleviated of some risk as well (Gale et al, 1997).

transparent to participants, they are often easier for employees to understand. These plans can be back-loaded, front-loaded or level-loaded, so overall they tend to be more age-neutral than traditional plans, although they do not allow sponsors to encourage early retirement with subsidized contributions to early retirees.

One of the primary drivers of hybrid plan use relates to funding requirements. Legislation requires DB sponsors to fund their plans based on current liability levels, but accounting procedures require sponsors to record projected liability levels. This requirement results in balance sheet liabilities and costs associated with DB plans (Gale et al., 2004). Hybrid plans offer legislation and accounting treatments that are more aligned, alleviating their sponsors of balance sheet liabilities and costs and ultimately affecting the firm's bottom line. The labor market also provides incentives for employers to establish hybrid plans. Firms with increasingly mobile workforces, younger labor pools, or those seeking to attract mid-level hires benefit from the flexibility of hybrid designs because many hybrid plans allow firms to appeal to multiple types of employees. In contrast, DB plans weight benefits heavily towards older and longer-tenured employees while DC plans tend to appeal to younger employees rather than established workers. Finally, the details of hybrid plans are often easier to communicate to employees, so they appeal to sponsors to the extent that they are better understood by participants (EBRI, 1996). Despite the significant costs of pension plans, the lack of understanding associated with traditional plans often leads employees to undervalue their benefits. The relative simplicity of some hybrid structures therefore makes them advantageous relative to traditional plans.

3.4.1 Cash balance plan

Cash balance plans are legally classified as DB plans, but they are designed to appear like DC plans in that they establish a hypothetical account for each participant where assets appear to accumulate over a participant's tenure (Leo et al., 1997). In a typical cash balance plan, an employee's account earns a pay credit equal to a predefined percentage of their current salary, plus an interest credit linked to an

index, such as a 30-year Treasury rate or a 1-year T-Bill rate plus a premium (Gebhardtsbauer, 1999). Accordingly, these hypothetical account balances do not reflect actual contributions or invested funds sustaining gains or losses. Cash balance plan sponsors promise to pay participants benefits in annuity form, and in this respect, these plans resemble traditional DB plans because they represent contingencies to the employer and impose investment risk on employers because of funding requirements (Leo et al., 1997). However, these plans differ from typical pension plans in that they define participant benefits in terms of a stated account balance. This makes them relatively simple from the participant's standpoint, because employees can readily observe their balance periodically (EBRI, 1996).

Additionally, cash balance plans do not hinder mobility like traditional DB plans because each participant has a hypothetical account of recorded retirement assets. This characteristic may make cash balance plans valuable for firms in industries with somewhat short employee tenure or high turnover. Furthermore, contributions may be adjusted from year-to-year, so these plans help to reduce firm cash flow variability (EBRI, 1996). While most cash balance plan advantages come from the DC portion of the plan, the disadvantages resemble those seen in most traditional DB plans. First, all investment responsibility lies with the sponsor, as does the investment risk (Allen et al., 1997). Second, while account balances are a function of annual salary credits and interest credits, annual contributions are determined based on actuarial valuation methods, so the firm does not escape this complex task rife with assumptions (Leo et al., 1997).

Bank of America launched the first cash balance plan in the mid-1980's (EBRI, 1996), and since their inception, the popularity of cash balance plans has been the largest driver of the growth of hybrid pension plan incidence (Green, 2003). In 1988, 1% of private industry full-time employees participating in DB plans received coverage from cash balance plans, and this statistic tripled by 1993 (EBRI, 1996). In 1997, nearly 6% of full-time private workers participating in a DB plan were covered by a cash balance plans (Green, 2003). By 2000, this figure more than quadrupled to reach 25%, and by 2003, this

percentage fell to 21%. In both 2005 and 2006, 23% of full-time private industry workers in firms using a DB plan participated in cash balance plans, and in 2009, this figure held steady at 23%.[122]

3.4.2 Pension equity plan

A pension equity plan is a hybrid pension plan technically classified as a DB plan. Participants in these plans earn a lump sum amount per year of employment that is based on their final salary amount rather than an average salary amount (Allen et al., 1997). This benefit is flexible in that if a participant's salary increases, the pay component of their lump sum formula can increase as well. Participants in these plans do not accrue benefits into hypothetical accounts as they would in cash balance plans, but instead project their benefits by multiplying the percentage pay credits they've earned, such as five % of final salary per each year of employment, and multiplying this by their final expected salary (Leo et al., 1997). Because benefits necessarily reflect the number of years worked, participants are not punished by early retirement or termination, as they would be with a typical DB plan. In this respect pension equity plans are valued by mobile employees or those seeking early retirement, much like cash balance plans (EBRI, 1996). However, they still allow employers to encourage long tenure because the percentage pay credit is often based on a scale that increases as an employee remains with the company.

Employers seeking to provide a hybrid plan without having to track annual pay credits like cash balance arrangements require would benefit from the simplicity of pension equity plans. However, with these plans, employers may end up providing larger total benefits than under an otherwise identical cash balance plan, because pension equity plans provide benefits that are heavily weighted towards the salaries provided to employees late in their tenure with the company, which is typically when employees receive the largest salaries (EBRI, 1996).

RJR Nabisco introduced one of the first pension equity plans in 1993,[123] and while other hybrids like cash balance pension plans are more common, pension equity plan incidence has grown since the late

[122] Source: Census Bureau Compensation Tables (url: http://www.census.gov/compendia/statab/2012/tables/12s0553.pdf).

1990's, chiefly due to their use in large firms. In 2000, 3% of the roughly 20% of full-time private workers with a DB plan chose to participate in a pension equity plan, up from 1 % in 1997 (Green, 2003). In 2003, this figure fell to 2%, where it remained in 2006 as well.[124]

3.4.3 Target benefit plan

Target benefit plans are combination plans that appear more similar to DC plans than other hybrids. Classified as DC plans,[125] target benefit plans appear like DB structures only in that sponsors use a projected future benefit amount for each employee, called the "target benefit", to determine annual contribution amounts in the present (Allen et al., 1997). Despite this guiding calculation, target benefit plans actually don't actually obligate their sponsors to guarantee paying any benefit amount in the future. Rather, these plans only require sponsors to pay the benefits that can be provided by the amounts in each participant's account (Allen et al., 1997). Because of this aspect of the plan, the firm isn't at risk if actual account earnings differ from estimated earnings, either due to pension accounting assumptions[126] departing from actual realizations or due to poorly-performing investments. In addition, most target benefit plans place investment decision responsibility in the hands of the participants, with sponsors offering a range of different investment options (Leo et al., 1997).

In essence, a target benefit plan allows a sponsor to use a DB formula to calculate contributions to set aside periodically in each participant's account, but the amount each participant receives resembles what they would in a DC plan because it is a function of the participant's investment choices and performance, not what the firm promised to set aside. Accordingly, sponsors are not required to obtain

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[123] Firm executives cited increased worker mobility as a driving factor of the creation of this plan. Since the firm's workforce was increasingly mobile, the company wanted a pension plan that offered portability and enabled them to attract mid-career hires, which the pension equity plan achieved (EBRI, 1996)

[124] Statistical Abstract of the United States, 2003: the National Data Book (url: http://www.lib.umich.edu/taubman/fulltext.html).

[125] Specifically, they are a specific type of money purchase pension plan. Sponsors use the current compensation of plan participants to determine contributions in a money purchase plan, but in a target benefit plan, sponsors determine their contribution requirements based on a targeted benefit amount (Allen et al., 1997).

[126] Pension trustees for target benefit plans must make actuarial assumptions about interest and returns earned by invested funds, estimations on salary growth rates and eventual mortality ages, just as they would with a traditional defined benefit plan.

PBGC insurance, although they do have to go through the process of actuarial valuation, which is complex and requires assumption-making in the process (Gale et al., 1997).

Target benefit plan sponsors have considerable flexibility in designing their plans, but since contributions are made based on a DB formula, these plans tend to reward longer tenure and older employees. Despite this, they are limited like most DC plans to a maximum contribution per year not exceeding the lesser of $30,000 or 25% of compensation. As a result, individuals with above-average compensation receive less than they would under a DB plan alone (EBRI, 1996).

From 1989 to 1990, target benefit plan incidence decreased from 11,028 plans to 9,770, but plan use grew from 1990 to 1991, when 10,150 plans existed. Despite the brief dip in plan use, both the number of total participants and the number of active participants in these plans rose over the 1989-1991 period. Active target benefit plan participant rates equaled 193,000, 196,000 and 207,000 in 1989, 1990 and 1991, respectively, while total plan participant rates equaled 202,000, 210,000 and 219,000 in 1989, 1990 and 1991, respectively. Similarly, total assets held in these plans increased year-to-year in the same 3-year period (EBRI, 1996). KPMG estimates suggest that 2% of private firm employees participated in a target benefit plan in 1995, up from 1% in 1993 (EBRI, 1996).

3.4.4 Floor-offset plan

A floor-offset plan is always part of a pair of separate pension plans that are merged to form a hybrid pension plan. In this arrangement, a DC base plan is coordinated with a DB floor plan to allow the sponsor and participants to benefit from characteristics of both types of structures (Allen et al., 1997). The floor plan is most often paired with a 401(k) plan or a profit-sharing plan, but there are documented instances of floor-offsets combined with ESOPs. The floor plan uses a standardized formula typical to a traditional DB plan to establish a minimum pension benefit level, and the DC component specifies additional but separate benefits according to its structure (Allen et al., 1996). If a participant's benefits under the DC arm equals or exceeds the minimum floor benefits earned under the DB arm, then the

participant receives only the benefits owed under the DC portion. If a participant's benefits under the DC arm are less than the minimum floor benefits, the DB portion compensates the individual up to the amount that would equal the minimum floor (EBRI, 1996).

The floor-offset plan protects participants against adverse movements in the investment value of their pension benefits by guaranteeing a floor value through the DB leg of the plan, while at the same time offering participants rewards from favorable investment movements (McGill et al., 2010). While this appears favorable to participants, it is unfavorable to sponsors, who are responsible for investment risk and decisions in both the DC and DB legs (Allen et al., 1997). Additionally, because the plans are tied together, DB contribution calculations depend not only on the DB plan performance, but also the DC plan performance. This means that if high volatility causes losses to the DC leg, funding requirements may rise for the DB plan, increasing and volatility and cost of the pension plan overall to the sponsor (EBRI, 1996). PBGC insurance is required for all participants, which is another downside to floor-offset sponsorship. Perhaps the largest disadvantage lies with reporting and administrative costs. Two separate plans require separate filing and requirement adherence, so a floor-offset can necessitate double or more administrative and reporting effort than one plan alone (Allen et al., 1997). There are advantages to sponsoring a hybrid comprised of 2 different plans, however. First, the DB leg can reward older and longer-tenured employees, while the DC leg can favor younger, newer, and more mobile employees. Additionally, as a hybrid made up of two plans rather than characteristics of two plans, floor-offsets can offer sponsors the advantage of obtaining DB- or DC-distinct qualities not available in other hybrids (EBRI, 1996).[127]

3.4.5 Age-weighted profit-sharing plan

Age-weighted profit-sharing plans are interesting combinations of profit-sharing plans, target benefit plans and DB plans. They are technically classified as DC plans, but they have DB characteristics.

[127] These qualities would be limited to traditional plans only. For example, disability programs are often incorporated into traditional DC plan benefits but not in hybrid plans with DC qualities. Floor-offset sponsors may choose to implement a disability program into their DC leg, while a pension equity plan sponsor may not (EBRI, 1996).

A firm maintaining an age-weighted profit-sharing plan distributes a predetermined, yet flexible percentage of company profits to employee retirement accounts, with a larger share designated for older employees (Allen et al., 1997). Despite the larger share of current contributions flowing to older employees' accounts, all employees should receive identical future benefits, because younger employees' funds benefit more from compound interest. In this respect, the difference in contributions is not considered discriminatory since the benefits distributed at each age group's eventual retirement are comparable by design (Allen et al., 1997). This is an important characteristic, because only non-discriminatory plans receive tax deductions on pension contributions (EBRI, 1996).

These plans are highly flexible in that they offer the sponsor discretion in setting and adjusting the percentage of firm profits earmarked for plan contribution, and they also allow firms to suspend contributions. Another advantage of these plans is that they incentivize employees to work towards benefiting the firm's profitability. These plans can also be beneficial additions to the pension plan schemes of corporations whose important or influential employees are notably older than other employees. On the other hand, employees not belonging the earmarked group may find these plans inequitable, and communicating their use to employees may require plenty of effort. Additionally, sponsors still must ensure proper compliance to non-discrimination requirements periodically, and when new employees are hired or current employees retire or are terminated, compliance alarms may be triggered. While all types of firms may institute age-weighted profit-sharing plans, most sponsors are smaller businesses in professional industries (Allen et al., 1997).

3.4.6 New comparability profit-sharing plan

A new comparability profit-sharing plan is a DC plan with DB characteristics. In these hybrid plans, participating employees are divided into groups based on a characteristic of the participants themselves. The plan sponsors contribute a predetermined but flexible percentage of firm profitability to accounts in aggregate, but this total amount is more heavily weighted towards those employees that fall

into a certain category based on the chosen participant characteristic. These plans are very similar to age-weighted profit-sharing plans, but the distinguishing characteristic used to divide employees into groups is something other than employee age, such as employee rank or role or geographical place of employment (Allen et al., 1997).[128]

The advantages and disadvantages of new comparability profit-sharing plans resemble those of age-weighted profit-sharing plans. Employers wishing to allocate the greatest portion of contributions to a select labor group will find these plans useful, and as with any profit-sharing plan, participants have an incentive to contribute to efficiency and productivity since they benefit with increasing firm earnings. Administration costs are significant, however. Periodically testing for and ensuring non-discrimination compliance is cumbersome, especially since changing employee demographics may throw off previous compliant statistics. Additionally, employees not in the favored group may feel slighted under these plans, and communicating the inner-workings of new comparability plans to all types of employees is complex (Allen et al., 1997).

3.5 Definition and characteristics of executive pension plans

Firms establish pension plans for a number of reasons, but the U.S. government offers advantageous tax treatment of pension plans to benefit firms maintaining these compensation tools as long as they are intended to benefit the average worker. As a condition necessary to earn these benefits, plans must satisfy non-discriminatory requirements to ensure that pension plans do not favor highly compensated employees. Accordingly, while highly-paid individuals may participate in broad-based pension plans, the compensation they may receive from such plans is drastically diminished compared to what they would receive if the plans did not limit executive participation (Allen et al., 1997).

[128] These plans arose because profit-sharing plans are theoretically desirable but practically unsuitable for firms with certain types of employee makeups. From Allen et al. (1997): "New comparability profit-sharing plans address some of the disadvantages of age-weighted profit-sharing plans; for example, since age-weighted profit-sharing plans provide higher allocation rates to older non highly-compensated employees as well as older highly compensated employees, an employer that has older non highly-compensated employees may be providing a benefit to such employees that is larger than intended." Qualified retirement plans are covered by ERISA, which is discussed in Section 4 of this paper.

Despite the favorable tax treatment of broad-based pension plans, firms often sponsor and maintain plans intended specifically for highly-paid individuals like executives. In the sense that these plans are non-qualified, the sponsor receives no favorable tax treatment of contributions made to these plans, and employees' must pay income taxes on the funds prior to withdrawing them during retirement.[129] Why do firms provide these plans when they receive no tax benefit? In general, they do so remain competitive to the highly talented individuals that make up the executive labor market, to shape the incentives of their most influential employees, and to retain these managers. Firms can achieve a more specific goal with executive pension provision, however. Since executive pension plans are DB plans representing liabilities to the firm, they tie the executives' retirement income to the health of the firm, thus providing managers with a form of "inside debt". By providing executives with future pay that creates a form of firm debt, executive-specific pension plans induce managerial conservatism and cause executives to be more risk-averse (Sundaram and Yermack, 2007).

3.5.1 Restoration plans

A restoration plan relates very closely to the non-executive pension plans that a firm sponsors in the sense that it is intended to restore the benefit lost to a highly-paid individual under a qualified plan that the individual would have received if Internal Revenue Code didn't limit benefits earned by highly-compensated employees from broad-based pension plans (Cadman and Vincent, 2011).[130]

3.5.2 Supplemental executive retirement plans (SERPs)

Supplemental executive retirement plans, also known as "top hat plans," are non-qualified deferred benefit plans for executive employees, who are too highly-paid to qualify for unlimited coverage through broad-based plans. SERPs are therefore intended to enhance the level of benefits already

[129] This is in stark contrast to qualified pension plans, which provide tax shields to employers who make contributions to the plan and defer employees' income tax payments until retirement benefits are paid as income. As Lee and Tang (2011) states, "while the invested pension funds grow tax-free, neither the firm nor its employees pay taxes on the investment's value appreciation, while the firm receives a current deduction for contributing funds to a qualified pension plan. Thus the plans provide a tax benefit to employees at no cost to the firm."

[130] Internal Revenue Code (IRC) Section 415, along with other IRC provisions, details these limits and the requirements that must be satisfied for a plan to be deemed non-discriminatory, or "qualified".

provided by a pension plan intended for broad-based employees and by a restoration plan as well (Allen et al., 1997). SERP is a broadly-applicable term, and firms use SERPS for a variety of purposes because employers are free to design these plans in any way desired to accomplish a range of different objectives. SERPs can be classified as DB or DC plans, and they can cover a narrow one key employee or a group of executives. These plans can reward participants with compensation forms not available in the broad-based pension schemes, provide full-career benefits to participants at their career mid-points, create incentive-based compensation linked to longer-term retention goals, or grant uniform benefits to a group of participants (Cadman and Vincent, 2011).

Firms were not required to disclose information on their executive-specific pension plans until December 15, 2006,[131] so information about the previous use of and the benefits provided by these plans is limited, but survey data from Bebchuk and Jackson (2005) and Sundaram and Yermack (2007) provides a glimpse into the extent of their use and the benefits they provide. Bebchuk and Jackson focus on 28 recently-retired CEOs and 36 active CEOs in the U.S., finding that 68% of the recently-retired CEOs and 64% of the active CEOs participated in employer-sponsored pension plans. The average actuarial value of the first group's pension benefits totaled over $15 million, and the second group's benefits averaged to nearly $20 million. Sundaram and Yermack (2007), using a sample of 237 CEOs, find that annual increases in top executive pension values comprise approximately 10% of total compensation for these employees.

3.5.3 Voluntary non-qualified deferred compensation plans

Voluntary non-qualified deferred compensation plans enable top executives to save on a pre-tax basis, and firms sponsor these plans as a means for providing these employees flexibility in financial planning. In most of these arrangements, funds in an account are invested, often at the behest of the executive in a bond index or mutual fund index, and earnings are allowed to accumulate tax-free during

[131] Both the Financial Accounting Standards Board (through the Statement of Financial Accounting Standards No. 123 (FAS 123R)) and the Securities Exchange Commission require firms to disclose the present value of the accumulated pension benefit attributed to each executive as well as the aggregate balance of non-qualified deferred compensation amount for each plan.

the investment period. When the benefits are paid out, the executive recognizes the taxable income and pays taxes accordingly, and the employer actually receives a minor tax deduction.

4 Legislation and policy

Pension plans provide a number of advantages to their sponsors and participants, but the tax benefits of plan sponsorship didn't exist until 1921, when the *Revenue Act of 1921* took effect. This legislation exempted interest income gained on funds belonging to stock bonus or profit-sharing plans from current taxation. More importantly, it established deferred taxation on employee-contributed funds to pensions, so that workers are taxed only when they receive distributions rather than when they make contributions. This is beneficial for the vast majority of participants in pension plans, who are likely subjected to a higher income tax bracket when they make contributions than they are when they withdraw retirement funds (EBRI, 1997). In 1926, legislators extended the interest income exemption to include funds belonging to pension trusts as well with the *Revenue Act of 1926*. The *Revenue Act of 1928* allowed sponsors to take tax deductions for contributions in excess of that which is required for a plan to be fully-funded (EBRI, 1997).

The *Revenue Act of 1938* made pension trusts irrevocable and cemented the "non-diversion" rule, which essentially prevented any tax benefits to plans that are not used exclusively to benefit sponsors and beneficiaries (EBRI, 1997). In 1942, legislators passed the *Revenue Act of 1942*, which standardized pension requirements and treatment by further tightening coverage requirements for qualified plans, limiting the maximum contributions allowed as tax shields and allowing for integration between private pension plans and Social Security (EBRI, 1997).[132] In 1962, the *Welfare and Pension Plans Disclosure Act Amendments of 1962* shifted the responsibility for protecting pension assets to the U.S. government from participants (McGill et al., 2010).

[132] Social security didn't exist until the mid-1930's, when the *Social Security Act of 1935* formed the program.

The passage of the *Employee Retirement Income Security Act* (ERISA) made 1974 the defining year for pension –related legislation.[133] While ERISA does not require firms to establish pension plans or dictate the minimum level of benefits provided by pension plans, it does establish jurisdiction over all firms providing pension plans to their employees (EBRI, 1997; McGill et al., 2010). This "full body of laws regulating employee benefit plans"[134] protects pension participants' benefits by instituting rules concerning the participation, vesting, funding, reporting and disclosure requirements of pension plans. Although other acts laid the foundation for some legal, taxation, accounting and investment treatment of pension plans, ERISA was the sweeping legislation that established formal codification and standardized treatment of pension plans in both the private and self-employed business settings (Allen et al., 1997). In this respect, it is the most important act governing the implementation and operation of pension plans. Title IV of ERISA outlined procedures to follow in the event of a healthy or distressed plan termination and established the Pension Benefit Guaranty Corporation (PBGC) to facilitate the orderly termination of healthy DB plan and enable the organization to step in and take over during distressed plan terminations (McGill et al., 2010).

Deferred compensation plans were not legally classified as qualified pension plans until 1978, when the Revenue Act of 1978 was passed. This act also formally created and codified 401(k)s. The *Tax Equality and Fiscal Responsibility Act* (TEFRA), passed in 1982, altered rules governing private pension integration with Social Security and created age limits for pension distributions. TEFRA also created maximum annual pension benefit and contribution limits (Allen et al., 1997). In 1984, the *Deficit Reduction Act* (DEFRA) extended these limits until 1987, established non-discrimination requirements for deferred compensation plans and changed TEFRA's age distribution requirements (EBRI, 1997; Allen et al., 1997). In the same year, legislators passed the *Retirement Equity Act* (REA) of 1984, which further altered the age requirements, but with respect to enrollment and vesting in pension plans rather than

[133] President Gerald Ford signed ERISA into law on labor day, which was September 2, 1974.

[134] ERISA covers all employee benefit plans, including pension benefit plans, health benefit plans and fringe benefit plans. In this essay, I focus on ERISA's details that pertain to pension benefit plans.

distributions. From Congress' perspective, the purpose of these alterations was to achieve a more equitable treatment of individuals such as young employees and females under qualified plans (Allen et al., 1997). The *Consolidated Omnibus Budget Reconciliation Act of 1985* tightened the definition of insured termination for pension plans covered by the Pension Benefit Guaranty Corporation and raised the premiums associated with PBGC insurance (EBRI, 1997; Allen et al., 1997).

Legislators enacted the *Tax Reform Act of 1986* to mandate broader and more comparable minimum pension coverage for non-executive employees, but it also instituted additional sweeping impacts to the private pension marketplace. First, it restricted 401(k) contribution allowances, strengthened their non-discrimination requirements and classified all employer-provided funds made to DC plans as contributions subject to the maximum annual limits. Additionally, it extended previous limits establishing maximum annual contributions, imposed taxes on early distributions and distributions over a certain threshold, and restricted maximum benefits payable to early retirees covered by DB plans. Finally, the act changed the integration efforts between private pensions and Social Security (Allen et al., 1997). In 1987, the *Omnibus Budget Reconciliation Act* altered rules governing the funding of overfunded and underfunded plans. It placed a ceiling on the contributions that sponsors with overfunded plans could use as a tax shield, confined minimum funding requirements for underfunded pensions and increased PBGC premiums (EBRI, 1997; Allen et al., 1997).

The *Omnibus Budget Reconciliation Act of 1989* created civil penalties that could be imposed on plan trustees of qualified plans who violated their fiduciary duty and created a punishment tax discouraging significant overstatement of pension liabilities in deductibility calculations (Allen et al., 1997). Legislators significantly reduced the compensation limit for qualified plans with the *Omnibus Budget Reconciliation Act of 1993* (Allen et al., 1997). In 1994, the Uruguay Round Agreements Act increased disclosure requirements for underfunded plans and established greater contribution requirements for underfunded plans as well. In 2001, legislators increased maximum contribution limits to DC plans and created tax credits that encourage small businesses to institute pension plans for their

employees with the *Economic Growth and Tax Relief Reconciliation Act* (EGTRRA) (EBRI, 1997). The *Job Creation and Worker Assistance Act of 2002* increased interest rate assumptions that plan trustees use to calculate DB plan parameters and projections, and this would remain the benchmark until the *Pension Funding Equity Act of 2004* officially defined the blended corporate bond rate as the benchmark interest rate used in DB assumptions (EBRI, 1997).

The *Pension Protection Act of 2006* likely impacted private pension provision the most since ERISA. This act strengthened the funding requirements for DB plans to lessen the probability that U.S. taxpayers might have to bail out the Pension Benefit Guaranty Corporation. The key catch was to do so in a way that did not cripple DB sponsors so badly that they would eventually terminate their DB plans altogether. The law also affected DC plan requirements as well. In particular, it changed participation stipulations to encourage automatic enrollment in 401(k) plans and enable sponsors of 401(k)s to offer investment counseling to plan participants (EBRI, 1997). Finally, the *Worker, Retiree, and Employer Recovery Act of 2008* passed mechanical corrections to the PPA of 2006 to craft the age-related requirements, benefit costs and hone the limits on income deductions. Interestingly, this act also contained the first legislation pertaining to the strain that the economic crisis put on firms' ability to maintain pension plans. It extended pension fund improvement periods, eased additional contribution requirements for organizations sponsoring DB plans, and waived minimum fund distribution requirements as well.[135]

Overall, the government faces a number of tradeoffs with respect to pension legislation. Encouraging private firms to provide pension plans to employees is paramount, as private pensions bear part of the retirement income burden of U.S. citizens, along with Social Security and voluntary individual retirement saving efforts. Yet, as the government provides more encouragement through subsidies or tax breaks, it has less income with which to fund Social Security or achieve other government goals.

[135] Source: "Technical Explanation of H.R. 7327, The 'Worker, Retiree, and Employer Recovery Act of 2008,' As Passed by the U.S. House of Representatives on December 10, 2008." Prepared by the Staff of the Joint Committee on Taxation: December 11, 2008 (url: http://www.dol.gov/ebsa/pdf/HR7327JCTTechnicalExplanation.pdf).

Legislation governing the accounting, contribution and funding requirements of DB plans is designed to protect all parties, including the sponsor, participants, and PBGC from plan insolvency. However, these limits constrain the sponsor and increase the difficulty of DB plan sponsorship, even leading DB sponsors to scale back or terminate their plans.

Going forward, legislators face similar challenges, but they must also consider the complex difficulties of legislation given the trends in the current time period with respect to the overall retirement income provision scheme in place in the U.S. Ensuring the cohesion of private pensions with Social Security must be of paramount concern, as should be the health of the PBGC. Similarly, future legislation must strike a balance between encouraging proper plan maintenance and administration, both for DC and DB plans, without discouraging plan sponsorship. Legislators must also carefully consider the increasing use of hybrid pension structures when crafting future pension legislation, as the requirements and restrictions that sponsors must recognize greatly affect their ability to sponsor and maintain these plans despite their multiple appeals apart from their legislative treatment.

5 Trends

The U.S. pension marketplace has experienced a large number of marginally influential movements since its inception, but a handful of aggregate trends have markedly changed the landscape of employer-provided pensions. In this section, I outline the primary developments that experts identify as most influential to the domestic private pension marketplace.

5.1 Shift from DB to DC structure

Firms in the U.S. once favored the DB structure when designed their pension plans, but this changed as pension sponsors gradually shifted preference towards the DC structure since the 1970's. In 1985, 65% of pension assets were held by DB plans in the U.S., while 35% were held by DC plans. By 1996, the dominant plan trend had reversed, as nearly 48% of pension assets belonged to DB plans while

52% belonged to DC plans. In 2005, DB plans held 40% of U.S. pension assets while DC plans held 60% of U.S. pension assets (Broadbent et al., 2006).

Participation numbers reveal the shift from DB to DC plan as well. In 1979, 62% of private sector employees participating in an employer-provided pension plan were covered solely by a DC plan, while 16% participated solely in a DC plan and 22% participated in both a DB and DC plan. By 1990, rates for those workers participating only in a DB plan fell to 34%, while 35% participated only in a DC plan and 31% participated in both plan types. In 2010, 69% of private-sector workers were covered solely by a DC plan, while 7% were covered solely by a DB plan and 24% participated in both plan types.[136]

Pension experts identify several reasons for the shift towards DC pension provision. First, legislation in the past has tended to favor DC rather than DB structures since the early 1980's (Gebhardtsbauer, 2004; Ghilarducci, 2006). This movement began with an amendment to the *Tax Revenue Act of 1978* that allowed participants to make voluntary contributions to DC plans with pre-tax dollars. It continued with acts that gradually reduced the benefits provided to DB sponsors and increased the reporting and administrative costs of DB plan maintenance (Hustead, 1998). The *Pension Protection Act of 2006* is a prime example of the latter, as it increased reporting and disclosure requirements, further strengthened rigid DB funding rules, and increased maximum contributions to DC plans.[137]

Second, the gradual shift in industry dominance from "old economy" manufacturing firms to "new economy" technology firms meant that the demographics of the marginal employee shifted as well. The types of workers in new economy firms are more mobile, and they demonstrated an increased desire to contribute to and manage their own pensions, which would be impossible in a DB structure (Broadbent et al., 2006; Munnell and Soto, 2007). In a related movement, more workers demand DC plans, especially 401(k) plans, leading firms to offer them in order to compete to attract participants in the labor pool (Aaronson and Coronado, 2005; Broadbent et al., 2006). Another labor-based consideration relates to

[136] Source: EBRI FAQs about Benefits-Retirement Issues (url: http://www.ebri.org/publications/benfaq/index.cfm?fa=retfaq14).

[137] Source: Butrica, B., H. Iams, K. Smith and E. Toder. "The Disappearing Defined Benefit Pension and Its Potential Impact on the Retirement Incomes of Baby Boomers." Social Security Bulletin 69, no.3 (2009) (url: http://www.ssa.gov/policy/docs/ssb/v69n3/v69n3p1.html).

longevity risk. With DB plans, firms pay benefits from retirement to death. Since U.S. citizens are living longer than ever, this places a strain on pension providers.

Finally, market conditions contributed to the movement as well. In the 1980's and 1990's, market conditions favored DB plans, as prosperous market conditions provided enough returns to satisfy funding and contribution requirements for DB plans. When the market began to decline and interest rates began to fall after 2000, funding rules requiring sufficient invested funds to satisfy soaring future liabilities caused many sponsors to significantly bolster their plans with company funds.[138] Indeed, employer contributions to DB plans tripled in the 2002-2003 period (Buessing and Soto, 2006). The economic crisis around 2008 had a similar effect on DB plans, as falling asset values caused many DB plans to be underfunded and necessitated increased contributions to satisfy funding requirements.[139]

5.2 Increasing plan hybridization

I provide detailed information on the corporate use of hybrid pension plans in Section 3.4, but the appealing utility of these structures is increasingly shaping the private pension landscape in the U.S. Bank of America created the first hybrid pension plan in 1985,[140] so hybrids have existed for the past three decades. While their use grew somewhat timidly overall in the 1990's and early 2000's due to their uncertain legislation and tax treatment (Gale et al., 2004), large firms did not shy away from these plans and were the first movers of the hybrid pension plan movement (McGill et al., 2010). In the past 15 years however, hybrids have become more commonplace outside of large firms. Driven in large part by a corporate movement to convert DB plans into hybrids, the growth of hybrid pension incidence has become a defining characteristic of pension plan offerings seen in domestic firms (EBRI, 1996; McGill et al., 2010).

[138] DC plans are not immune to market conditions, but these plans have flexible contributions schedules by design, and they are not subject to minimum funding requirements like DB plans.
[139] Munnell et al (2008) estimates that DB plans lost as much as $1 trillion during the crisis, in aggregate.
[140] This hybrid was a cash balance plan. Source: EBRI Brief on Hybrid Pension Plans (url: http://www.ebri.org/pdf/briefspdf/0396ib.pdf)

5.3 Change in linking pay to performance in retirement plans

There are many benefits to providing pay-to-performance compensation such as own-company stock or options to employees. First, firms doing so align employee incentives with those of shareholders, reducing agency costs and improving firm performance (Conte et al., 1996; Park and Song, 1995; Chang, 1990). Second, providing equity or equity-based pay to employees allows sponsors to substitute cash wages with employer shares to aid in cash conservation efforts (Kim and Ouimet, 2011). Finally, because providing employees with equity pay places a portion of firm ownership in employee hands, firms that utilize stock and option grants in a non-trivial manner insulate firms from takeover threats (Beatty, 1995; Rauh, 2006).

Employers are not limited to stock and option provision through grants, however, and many choose to tie pay to performance with retirement benefit packages. Private industry firms demonstrated the desire to use own-company stock as a retirement benefit asset when they flocked to offer ESOPs in the late 1970's and 1980's. However, the unique characteristics of this plan proved damaging in the 1990's and 2000's, and when Enron's highly-publicized collapse wiped out the value of 62% of the plan's retirement assets overnight, the costs of using own-company stock as a retirement asset were highly scrutinized. Firms can choose from a handful of viable retirement plans that encourage employee ownership without limiting asset diversification, and interest in these plans increased in the 1990's and 2000's.[141] Even though these structures do not share the same drawbacks of the ESOP structure, their use still may be suboptimal. The value loss associated with investing retirement assets in own-company stock through any pension plan is costly because participants still discount shares they receive in arrangements such as 401(k) plans and other defined contribution plans.[142]

[141] Common ESOP alternatives include 401(k) plans with stock provisions, stock option plans, stock bonus plans, profit-sharing plans and money purchase plans with stock provisions and employee stock purchase plans. ESOPs bar diversification efforts, require all eligible employees to participate, do not allow participants to determine how much to invest in the plan, and prevent participants to access funds unless they leave the firm or become fully vested. On the other hand, ESOP alternatives allow for and encourage diversification efforts, allocate discretion if investment levels and plan participation to employees, and grant them access to benefits prior to termination, retirement or death (Perun, 2000).
[142] The value-losses associated with failing to diversify pension assets are large, and may be more severe in recent years than in the past due to sweeping changes in private pensions and an increasingly crippled social security system. Employees invested in single plans within the highest

Pension experts assert that the desire to allow employees to share in the success of the firm has not lessened, but private companies have chosen a different method than providing employees own-company stock through retirement plans. Instead, firms prefer pay-to-performance pension arrangements like profit-sharing plans, pension equity plans and cash balance plans (EBRI, 1996). Since these plans allow organizations to tie retirement contributions or credits to firm performance, they achieve incentive alignment that results in increased morale, motivation and productivity, but since they do not necessarily use stock as a compensation tool, they allow firms to avoid the value loss and other drawbacks associated with structures such as ESOPs or ESPPs.

6 Predictions for the future and policy implications

All of the discussion in this paper concerns private pension plan provision in the United States. Section 2 contains a detailed account of early pensions and the evolution of the domestic pension marketplace. Section 3 discusses the various pension options that firms choose from when shaping their pension schemes and provides an in-depth examination of the characteristics of each of these choices from the firm's perspective. Section 5 explores the trends observed in the private pension marketplace during the twentieth century and identified the causes and consequences of these trends. What remains to be seen with respect to employer-provided pensions in the future? Of course, without a crystal ball, one can only guess, but I identify a number of forces that may potentially shape the U.S. private pension marketplace in the future.

6.1 Regulation aimed at decreasing the burden of pension plan sponsors

In 2008, the first pension legislation aimed at decreasing the burden of pension provision on private industry firms appeared in the *Worker, Retiree, and Employer Recovery Act.* This act eased the

quintile of own-company ownership forgo from 42% to 55% of their wealth due to improper diversification (Meulbroek, 2002; Poterba, 2003), and employees with a diversified plan (in addition to the undiversified portfolio) sacrifice from 25% to 33% of their wealth compared to a well-diversified portfolio. Employees do not bear these costs alone, because to the extent that risk-averse participants bear increased uncertainty, they will demand a risk premium in compensation (Mitchell and Utkus, 2002). Meulbroek (2003) provides an example to illustrate: "to grant an employee stock worth $42,000, the firm must give the employee stock with a market value of $100,000".

strain that some requirements introduced in the PPA of 2006 caused, specifically to sponsors of DB plans. Legislators proposed the act after the economic crisis placed a strain the ability of private corporations to sponsor and maintain pension plans, and it lessened sponsorship burden by extending improvement periods, alleviating certain DB contribution requirements, and waiving minimum distribution requirements. Employers praised the act and called for additional support in reducing their retirement income provision burden, and it appears that pension experts listened.

Additionally, legislation establishing the legal and tax status of hybrid plans has encouraged their sponsorship among corporations. Given that these plans are often instituted to lessen the burden that a DB plan places on a sponsor, legislation encouraging their adoption represents another step in the movement to lessen pension burdens by facilitating firms to more easily offer pensions that do not place an undue strain on their sponsors. Employers maintaining DB plans gained additional relief when the Pension Funding Stabilization bill was signed into law as a portion of the *Moving Ahead for Progress in the 21st Century* (MAP-21) legislation on July 6, 2012. The bill made allowances regarding the interest rate that sponsors must use when valuing actuarial liabilities,[143] which are used to determine minimum required contributions, and also established a five-year plan to standardize benchmark interest rates in the future. These actions aid DB plan sponsors by reducing contribution requirements in the short-term and introducing long-term contribution stability, thereby reducing contribution volatility, a non-trivial source of risk affecting DB sponsors.[144]

Finally, the PBGC announced a proposal that would ease reporting and disclosure requirements for more than 90% of companies and plans covered by the PBGC in 2013.[145] Since reporting and disclosure requirements represent a large administrative cost to DB sponsors, this proposal would significantly reduce the time, effort and expenses associated with DB sponsorship. Taken together, these

[143] Specifically, the bill allowed employers to use a 25-year average benchmark interest rate index instead of a 2-year average benchmark interest rate index.
[144] Source: Fram, A. "New law to give companies a break on pensions." *USA Today*, July 9, 2012. (url: http://usatoday30.usatoday.com/money/industries/story/2012-07-09/New-law-gives-companies-pensions-break/56114600/1).
[145] Source: PBGC News and Policy Press Release, April 3, 2013 (url: http://www.pbgc.gov/news/press/releases/pr13-06.html?CID=CPAD07ACAPR032013).

legislation changes and proposals indicate that government officials may be aware of the strain that prior legislation and a weakened economy placed on private pension sponsors and are acting to reverse the situation, a trend that is likely to continue in the future.

6.2 Re-design of Pension Benefit Guaranty Corporation

The PBGC takes on a number of responsibilities when a private pension plan terminates under distress, and despite the small number of distressed terminations and the premiums the organization receives from healthy plan sponsors, these responsibilities have the potential to cripple the solvency of the PBGC. Section 3.1 contains more institutional details on the distressed termination process, but the organization basically assumes control of the assets that are pledged to fund a plan under distress termination, as well as the liabilities that arise when firms promise to pay future retirement benefits to their employees. Legislation limits the amount that the PBGC must pay to beneficiaries of distressed terminations, but the PBGC faces a greater strain as the assets funding a distressed termination pension plan fall below the greater of the maximum benefit as dictated by legislation and the actual benefit promised by the plan's sponsor.

Distressed terminations are relatively rare, but if a small number of largely underfunded plans to enter distress termination in any period, the PBGC would experience huge deficits as a result. This is precisely what happened in 2001 through 2004, when several pension failures in the air travel and steel industries reached large-scale proportions, contributing to the PBGC's deficit of over $12 billion by 2004 (Broadbent et al., 2006). Even though improving market conditions resulted in fewer underfunded distressed terminations in the next four years, the financial crisis and it's repercussions lead to a spike in distressed terminations from 2008-2010 (McGill et al., 2010). This increase in distressed plan failures contributed greatly to the PBGC's deficit, which reached $22 billion in 2010, $26 billion in 2011,[146] and

[146] Source: Pension Benefit Guaranty Corporation Press Release "PBGC Reports Record $26 Billion Deficit for 2011." PBGC News and Policy, November 15, 2011 (url: http://www.pbgc.gov/news/press/releases/pr12-06.html).

an all-time high of $34 billion in 2012.[147] The precarious position of the PBGC has been apparent to policy-makers since the first wave of large-scale pension failures in the twenty-first century, as the Government Accountability Office designated the PBGC's situation as a "high-risk" area "in need of urgent attention and transformation to address economy, efficiency, or effectiveness" as early as 2003.[148]

Despite the high-profile recognition of the PBGC's situation, legislators have yet to undertake any substantive reconstruction of the organization's operation. However, recent proposals suggest that a re-examination of the PBGC's situation may be imminent. First, in the President's Deficit Reduction/Tax Reform Proposal known as the Bowles/Simpson Proposal, legislators recommend an increase in the flat-rate premiums that the PBGC will charge in 2014 and support a move towards a premium-setting system that takes each plan sponsor's credit risk into account when setting the variable-rate premiums per period. Second, the Domenici/Rivlin Proposal suggests an immediate fixed-rate premium increase as well as a variable-rate premium to bolster the assets of the PBGC.[149] Finally, the House (Ryan) Budget Proposal explicitly conveys concern regarding the PBGC's financial standing and goes further to suggest a large-scale reform of the organization.[150] While the actual passage and implementation of these proposals is not certain in the least, they represent a higher level of action in consideration of the PBGC's situation than in the past, as previous legislative efforts only involved joint sessions or hearings outlining the situation rather than proposed action.

6.3 Large-scale shift in worker demographics

Experts expect the future private industry labor pool to be marked by increased participation of women and more racially and ethnically diverse workers (Allen et al., 1997). A shortfall in the supply of

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[147] Source: Fletcher, M. "Pension Benefit Guaranty Corp. running $34 billion deficit." *The Washington Post*, November 16, 2012 (url: http://articles.washingtonpost.com/2012-11-16/business/35505545_1_pbgc-premiums-pension-plans-troubled-pension-funds).

[148] Source: Pensions and Investments (2010). "PBGC Reform a Priority." (url: http://www.pionline.com/article/20101227/PRINTSUB/312279998).

[149] Source: Pension Benefit Guaranty Corporation Press Release "President's Budget Strengthens Pensions by Giving PBGC New Premium Authority." PBGC News and Policy, February 15, 2011 (url: http://www.pbgc.gov/news/press/releases/pr11-22.html).

[150] Source: Skinner, Jessica (2011). "Tax Reform: Changes in PBGC Premiums Could Create a New Outlook for Defined Benefit Plan Sponsors" *The Key*, Lockton Retirement Services (url: http://www.lockton.com/Resource_/PageResource/MKT/TaxReform_ChangesinPBGC.pdf; http://www.fas.org/sgp/crs/misc/R42521.pdf).

well-educated domestic workers is also likely to increase the intensity with which firms will have to compete for highly-skilled workers (EBRI, 1996). Additionally, employee mobility is likely to continue to increase, perhaps even spreading to those industries more commonly known as old-economy industries (EBRI, 1996). All of these factors will influence how employers plan and adjust their pension schemes in a number of different ways.

First, the presence of more females in the private industry workforce indicates that firms must consider how the longer life expectancy of female relative to males affects their defined benefit pension promises.[151] Since workers covered by DB plans are entitled to receive benefits from retirement to death, a large influx of female workers could translate into a larger pension burden in the future and greater contributions required in the present. Additionally, women tend to be more mobile than men throughout their careers, so employers wishing to appeal to this portion of the workforce will have to consider offering portable DC or hybrid plans in their pension scheme. It is highly likely that the increasing mobility of private industry workers will further underscore the appeal of offering a DC or hybrid plan. Since these plans are portable while DB plans are not, firms that only sponsor DB plans may find it difficult to recruit in the future, and therefore should consider adopting a DC plan or converting an existing DB plan into a hybrid structure. Finally, as the labor supply of educated workers tightens, all measures of compensation offered by a firm, including pensions, become more important because they can be used increasingly as recruitment tools in conditions of increased competition for labor.

6.4 Increasing use of hybrid plans

The growth in hybrid pension plan use in the 2000's is well-documented, and this trend is not likely to slow any time soon. I identify three forces as the primary drivers of the continued growth of hybrid plan popularity. First, legislators have suggested proposals that clearly establish the tax and administrative treatment of most hybrid plans. Anecdotal evidence suggests that even though firms

[151] Estimates from the 2000-2005 period suggest that women are expected to spend 23.1 years in retirement while males are expected to spend 19 years in retirement, on average (McGill et al, 2010).

desired to offer hybrid pension plans in the late 1990's and early 2000's, some were reluctant to sponsor hybrid plans because the applicability of pension legislation to these plans was uncertain. Second, corporations in the U.S. have demonstrated a tendency to consolidate their total pension offering over the past decade. In 1993, publicly-traded firms in the U.S. offered 3.6 plans per firm. This figure fell consistently since then, reaching 2.4 plans per firm in 2007. This pension consolidation was largely driven by firms that chose to merge two separate pension plans into one, which very often resulted in a hybrid plan. Given that pension consolidation is unlikely to slow in the near future, this trend will continue to contribute to the growing use of hybrid plans as it did in the past.

Additionally, U.S. employers are likely to see another large-scale shift in employee demographics, which will affect the types of plans firms choose to offer to remain competitive to the domestic workforce. I detail this probable trend in Section 6.4, but experts report that the demographic shift will be accompanied by increased participation among females and younger members of the workforce, who are likely to be employees with shortened tenures. Since hybrid plans and defined contribution plans offer characteristics that appeal to more mobile and younger employees, the demographic shift may also be accompanied by a growing popularity of hybrid pension plans. Finally, the aggregate shift in popularity from DB to DC seemed to imply that DC plans are, for the most part, more desirable from the sponsor's standpoint, but some employers still prefer to offer DB plans despite their disadvantages. Most hybrid plans offer characteristics of DB plans, and firms are increasingly turning to offering hybrid plans with appropriate DB characteristics rather than continuing to sponsor traditional DB plans. Despite the potential for future legislature aimed at easing the requirements placed on DB sponsors, the increased incidence of hybrid pension plans replacing traditional DB pension plans seems unlikely to slow, which will likely contribute to the overall growth of hybrid pension use among corporate sponsors.

7 Conclusion

Corporations in the United States use pension plans to provide income to their employees after retirement, and this method of compensation is a vitally important way that firms recruit and retain employees. The government instituted the first public pension plan in the United States, but played an equally vital role in the development of the private pension marketplace in instituting various incentives endorsing employer-provided pension plans. The private pension plan marketplace, which began in the late nineteenth century, grew at impressive rates in the twentieth century, as a number of economic, social, political and demographic developments affected the appeal of the private pension and the necessity of offering pensions to compete for labor in addition to government-provided incentives.

As private pension sponsorship grew, a number of trends marked the marketplace. Firms used to flock to traditional defined benefit plans, through which sponsors promise to pay employees a periodic amount, usually based on salary, from retirement to death. Contemporarily, the popularity of these plans has waned, as they are being phased out in favor of defined contribution plans. Under these plans, firms promise to periodically contribute to the accounts of currently participating employees, instead of promising to pay a future amount to participants during retirement like they do in defined benefit plans. Defined benefit plans face an uncertain future given that they place a higher amount of pension-related risk and overall sponsorship burden on their sponsors compared to defined contribution plans, but they are unlikely to disappear altogether thanks to legislation aimed at easing their sponsorship burden. This trend has also highlighted the interesting and dynamic role of the PBGC as the insurance provider for defined benefit sponsors in the U.S., and the strain that the increasingly high proportion of underfunded plans have placed on the organization. Legislators have demonstrated a focus on the strained situation of the organization, and future proposals are likely to include substantive plans to lessen the PBGC's burden.

In a very contemporary development, firms have begun to use plans with characteristics of both defined benefit and defined contribution plans. These so-called hybrid pension plans are likely to appear

in the pension schemes of more and more publicly-traded firms in the U.S., and legislation aimed at codifying these plans is currently in the works. Another development concerns the effect that changing worker demographics and their effect on the overall shape of pension structures in publicly-traded corporations. Competition for laborers is projected to increase, and as workers become more mobile and more diverse, the demand for defined contribution plans increases and pension plans become more crucial as compensation tools. Finally, it must be noted that private pensions are one of the three sources of retirement income for most American citizens. Social Security and independent retirement savings efforts bolster the income that people receive from private pensions, but given the precarious nature of Social Security, private pensions will play a more important role in the three-pronged retirement income system than ever. In the future, the guidelines dictating how private pension systems integrate with Social Security benefits must be re-examined and re-worked, as this could profoundly affect the efficacy of the retirement income scheme in the U.S.

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APPENDICES

A Chapter 1

A.1 Changes in deferred compensation diversification opportunities

Diversification is a fundamentally accepted principle, and firms were likely aware of the drawbacks of the ESOP structure's diversification barriers before adopting them. So what has changed since the ESOP peak that makes enabling employee ownership through an ESOP more costly? Four trends emerged in the pension marketplace that could account for this. First, a profound shift in the pension offerings of public firms caused employees to bear more pension risk and left them with fewer choices. Firms offer fewer plans to their employees than in the past, and the pronounced popularity swing from defined benefit (DB) plans to defined contribution (DC) plans (Kruse, 1994; Munnell and Perun, 2006) shifted most pension risks from employers to employees. Since employers bear investment responsibility and asset risk in DB plans while employees bear the responsibility and risk in DC plans, the transition to DC plans exposed households more to market fluctuations and made retirement income prone to greater variability. As a result, ESOP participants who also invest in additional plans[152] bear more total risk after the shift to DC plans than they did prior. Second, private pension plans comprise a higher proportion of total retirement income than in the past (Munnell and Perun, 2006). Retirees draw income from private pension plans, Social Security, and individual retirement accounts. If a larger weight is placed on one source of retirement income, the importance of preserving that source's value becomes paramount relative to the other sources, thus the more sensitive this source's income is to any risk it is exposed to. Third, the threat of litigation risk due to a drop in stock prices increased since the early 2000s, as many groups of plan participants brought legal action against plan sponsors after the value of their

[152] Department of Labor data indicates that publicly traded firms offered nearly 3 plans per year from 1992-2008, on average. In 1992, public firms maintained 3.6 plans, on average, and this number fell to 2.6 plans by 2008. In 1992, roughly eighty percent of ESOP firms had a DB plan in addition to their ESOP. Five years later, this statistic fell to around sixty percent.

retirement assets plummeted in lockstep with the stock prices of their employers, many of whom maintained ESOPs.[153] Most of these stock-drop cases ended in significant settlements, which lead to huge liabilities and increased pension insurance costs for the firm (Martin and Fine, 2004; Cole and Fier, 2011).[154] Finally, firms can choose from a handful of viable substitute plans that achieve the same purpose of ESOPs without limiting asset diversification. Firms are increasingly using ESOP alternatives as a vehicle for employee-ownership provision, and interest in these plans may account for some ESOP attrition seen since the early 1990's (Perun, 2000).[155]

A.2 Definition and characteristics of ESOP substitutes

Each of the substitute plans I account for allows sponsoring firms to reward employees with ownership of the firm, but collectively, they are different from ESOPs. ESOPs limit diversification efforts, require all eligible employees to participate, do not allow participants to determine how much to invest in the plan, and prevent participants from selling stock until they leave the firm or become fully vested. ESOP alternatives are much less restrictive—they allow for and encourage diversification efforts, allocate discretion of investment levels and plan participation to employees, and grant participants access to their benefits prior to prior to termination, retirement or death. The proliferation of these employee ownership plans could play a part in the demise of ESOPs in public firms.

[153]Stock-drop litigation is brought when a firm's stock price falls, which triggers a significant loss in retirement funds invested in own-company shares, either through an ESOP or another employee ownership plan. Plaintiffs allege that the firm's officers, who are also plan fiduciaries, did not undertake their fiduciary duty to disclose certain material information about the firm to the plan to allow the plan to avoid imprudent investing in own-company stock. A cursory glance at some of the public companies that were parties in these stock-drop lawsuits indicates that a good number of them appear in my sample. Examples include GM, Enron, Royal Dutch Shell, Honeywell, Textron, McKesson, Sears Roebuck, Fifth Third Bancorp, Polaroid, Keycorp, Medtronic, McDonnell Douglas, WR Grace, Reynolds, EDS, Morrison Knudson, Corning, and International Paper.

[154]"Because of the potential size of these lawsuits, even when cases are settled prior to going to trial, the cost of litigation can be significant with settlements in the range of millions of dollars (Sharma, 2007). For example, in 2005, Honeywell settled with plan participants for a total of $14 million in cash. In 2007, Krispy Kreme Doughnuts settled its stock-drop suit for a total of $8.27 million."

[155]As early as the 1980', public firms saw the benefit of employee ownership, but chose to use alternatives methods such as employee stock purchase plans, equity grant plans, and option grant plans to do so. In July of 1988, PepsiCo became the first Fortune 500 firm to regularly offer employee ownership in the form of stock option grants to full-time employees working at restaurants under company control, and a number of public firms followed suit (Nasar, 1989). In the 1990's, 401(k)s became the most popular plan through which employers provided own-company shares as compensation (Rauh, 2006; Huberman and Sengmueller, 2004). From 1995 to 1999, the share of US firms offering stock option plans more than doubled from 13% to 31% (Fields, "A Wealth of Options" *Fort Worth Star Telegram* 8/8/1999).

A.2.1 401(k) plan with stock provision

A 401(k) plan, which is also known as a cash or deferred arrangement (CODA), is a qualified type of profit sharing or stock bonus plan that allows employees to receive employer payments either in cash or as contributions to the plan. Employees can voluntarily participate in these defined contribution plans by arranging with their employers to reduce their regular compensation and to make an employee contribution to the plan in the amount of the reduction, known as an elective contribution (Huberman, 2003). An employer can, and most often does, match employee contributions by contributing the same amount of money as each employee, in the form of stock or cash.[156] Mitchell and Utkus (2002) report that the most common matching scheme observed for 401(k) plans in the U.S. is $0.50 per employee dollar up to 6 percent of pay. 401(k) plans have the added bonus of encouraging diversification, and they have become increasingly popular at public workplaces in the U.S. since their inception. Department of Labor data indicates that the number of 401(k) plans per year grew at an average annual rate of 16 percent from 1984-2008 while the number of active participants per year grew at an average annual rate of 9 percent for the same period. 401(k) plans are the dominant form of defined contribution plan offered by United States employers.

A.2.2 Employee stock purchase plan (ESPP)

An employee stock purchase plan (ESPP) is a benefit plan that allows employees to purchase company stock with their own after-tax dollars, often through payroll deductions, generally over a three-month to twenty-seven month offering period. ESPPs appear almost exclusively in public companies. Not only do ESPPs allow participants complete freedom to access their shares any time once they become vested (although employees who choose to sell their shares on the open market are subject to taxation of capital gains), but most ESPPs also offer stock at discounted prices, so employees are more likely to profit from this type of employee ownership arrangement than from an ESOP. Firms that offer shares at a discounted price contribute the difference of the price at which the shares were obtained and the discount

[156] Holden and Vanderhei (2001) report that over 90% of employers in the United States match contributions.

price at which they are offered to the employees. With regards to the employer's tax liability generated at the time of the share award offer, ESPPs exist in both the qualified and non-qualified variety. Qualified ESPPs enjoy some of the favorable tax benefits that ESOPs are provided[157], but they also carry regulatory requirements that must be met for the sponsoring firm to receive the positive tax treatment. Non-qualified ESPPs are not subject to the coverage, vesting, nondiscrimination, distribution and other requirements of plans covered above because they are not considered pension plans under ERISA. In both qualified and non-qualified ESPPs, the plans are typically designed "such that employees can elect to make deductions from their compensation and this deferral is then credited to an individual account where it is used to purchase stock (or stock options, in some cases)." (Huberman and Sengmueller, 2004)

A.2.3 Profit-sharing plan

In general, a profit-sharing plan is a voluntary qualified defined contribution pension benefit plan designed to allow sponsoring companies to allow employees to earn a share in the profitability of the firm. In a profit-sharing plan, the employer makes regular contributions to a trust set up for this purpose. Depending upon the plan, there need not be a definite rule according to which the contributions are made. The contributions are only required to be "recurrent and substantial" for the plan to remain in good standing with the IRS, but the firm has some flexibility in designing contributions since this type of plan is usually based on the profitability of the firm. Most firms base their contribution amounts explicitly upon the profit levels or expected profit levels of the current year, and the sponsor may change contribution amounts from year-to-year. Legally, the term "profit-sharing plan" is an umbrella term that applies in general to plans in which the firm may decide contribution levels based on the profitability of the firm. Inasmuch as other types of plans listed in this section of the appendix adhere to this description, they are legally considered profit-sharing plans. (Mitchell and Utkus, 2002)

[157] The Revenue Act of 1921 gave stock bonus plans and profit-sharing plans tax-favored status, so these general types of plans enjoyed tax advantages long before the birth of the ESOP as a qualified plan coded in ERISA (Blair, Kruse and Blasi, 2000). While the extent of the tax benefits available to sponsors of these plans doesn't seem to compare to the extent of ESOP-related tax benefits, the chronology is worth noting.

A.2.4 Stock bonus plan

A stock bonus plan is a voluntary qualified defined contribution pension benefit plan established and maintained by an employer that provides benefits similar to those of a profit-sharing plan, except that the benefits are designed to be distributed in the form of own-company stock. (Huberman, 2003) According to employee-ownership experts, stock bonus plans predate all other types of employee-ownership benefit plans and remain the oldest type of plan still used in modern corporations. These plans are quite flexible, and they allow for firm matching, but do not require it.

B Chapter 2

B.1 Description of pension plans

In DB plans, firms are liable to pay specific future benefits to participating employees at the time of their retirements. [158] To finance these future liabilities, firms pledge collateral, set aside the present value of future benefits as employees participate in the plan, or make periodic payments to build funds over time. The plan's liability grows over time, and firms bear the responsibility of ensuring that their plan's asset value adequately covers its promised benefits. This task is complex because it involves making assumptions about inflation, investment returns, and the life expectancies of participants, and research shows that firm sponsors can adjust these assumptions to manage firm earnings and income levels (Weidman and Goldberg, 2002, Coronado and Sharpe, 2003 and Bergstresser, Desai and Rauh, 2006). Finally, the firm must also adhere to strict rules about funding based on current legislation, a task that requires complex calculations based on somewhat arbitrary assumptions.[159] Overall, DB plans impose investment risk, market-timing risk and longevity risk on their sponsors in addition to entailing

[158] Participants receive a monthly amount that is paid until the employee's death. It based on a function of the participant's years of service with the firm, earnings history and age. Because benefits are owed until a participant's death, the firm is exposed to longevity risk, and as the lifespan of participants grows, the firm bears a more substantial burden than otherwise.

[159] Funding status refers to the value of plan assets with respect to the liability of the sponsor to the plan's beneficiaries. Plans with asset values less than their liability amounts are underfunded, and plans with asset values in excess of liability amounts are overfunded. When assets equal liabilities, plans are fully funded.

rigid pension contribution limits and liabilities (Petersen, 1996 and Broadbent, Palumbo and Woodman, 2006).

DC plans shift the risk of investment to participants, because firms simply contribute to participant accounts periodically, making no pledge about the value of future benefits. DC plans vary, but in general, each employee has an account into which the firm's and employee's contributions collect, and the employee has discretion over how the account's funds are invested. The amount an employee receives at retirement is a function of the contributions made and the investment earnings that accumulate in the account, and since plan participants are responsible for making investment decisions, they bear the risk of ensuring that their retirement funds do not lose value over time. DC plans are more straightforward than DB plans, because the DC framework focuses on the value of assets currently in a participant's account rather than the estimated value of assets in the future based on complex earning power and investment allocation assumptions. They also afford firms a large degree of flexibility, since DC plans are always fully funded by definition, do not impose liabilities on the firm's balance sheet and allow the firm discretion in adjusting contribution levels from year to year (Petersen, 1996).[160] Overall, DC plans shift investment, market-timing and longevity risk from sponsors to participants, all the while allowing flexibility in pension contribution levels without imposing a liability on the sponsoring firms (Broadbent, Palumbo and Woodman, 2006).[161]

B.2 Description of data

I create a panel dataset primarily from Compustat's Execucomp database and from Internal Revenue Service Form 5500 pension data. All firms maintaining a benefit plan of any sort for their

[160] In recent years, an increase in pension-related lawsuits has plagued firms offering DC plans, which is especially pronounced in firms with 401-K plans. Since litigation risk does arise when a firm adopts a DC plan, they are not technically risk free. Regardless, they are far less risky to the firm than DB plans.

[161] DC plans also have two more distinctive features compared to DB plans: they do not punish mobility and they allow sponsoring employers to match contributions or provide pension funds in the form of employer stock. Bodie et al. (1985), Bader (1995) and Blake (2005) show that while DB plans are typically non-transferrable, DC plans are ideal for mobile employees since the assets in a participant's account legally belong to the participant rather than the firm, and this aspect has been increasingly important as the mobility of the labor force has increased over time. Firms benefit from using employer stock as contributions, because this is a low-cost contribution method, can be used to thwart unwanted takeover attempts, effectively ties the payoffs of any employee to the performance of the firm, and induces mutual monitoring and coordination efforts among rank-and-file employees (Beatty, 1994; Beatty, 1995; Rauh, 2006).

employees must file a Form 5500 in a timely manner for each plan sponsored. In this multi-schedule filing, firms provide information about the plan along with details on coverage, participation, funding and financial aspects of the plan. I focus on pension plans sponsored by single employers.[162] From 1992 to 2007, there were 104,874 pension plan-year observations, resulting from 18,754 publicly traded firms maintaining 19,996 separate pension plans. Over 80% of the firms maintained only DC plans, so restricting the sample to firms with DB plans results in 3,492 firms with 7,619 different DB plans. I identify the firms from this subset that adopt a new DC plan in the same year they have a DB plan, finding 839 firms doing so. Restricting the pension sample to plan-year filings that were not subsequently amended and replaced by new filings resulted in 697 adoptions. I use data from Execucomp on executive compensation, which is comprised of total wages, cash incentives, deferred compensation, and equity-based pay. From 1992 to 2007, 3,233 separate firms appeared in this database, resulting in 29,710 firm-years of compensation data. Merging the pension and executive compensation datasets results in 11,850 firm-year observations comprised of 294 DC adoptions and 11,556 non-adoptions. I obtained accounting data from Compustat to construct control variables, and financial variables not expressed as ratios are adjusted for inflation and expressed in 2007 dollars.

[162] Multi-employer plans are maintained by a collection of sponsors and organized into common or master trusts. It is difficult to attribute plan-specific information or decision-making power to any of the firms in the collection of firms. Since the empirical specification involves a firm-level decision as the outcome variable, multi-employer plans would complicate the empirical specification. Excluding multi-employer plans eliminates less than 50 plans per observation year.

Table B.2 - Definition of Explanatory Variables

This table provides the information on the variables of interest and the control variables used in the regressions. Column 1 categorizes the proxies and Column 2 provides a description of the intended variables the proxies are designed to capture. The third column shows the name of the variables, and the final column describes their definitions.

Variable	Proxy	Definition
Proportion of compensation devoted to equity-based pay		
Past equity-based compensation composition	PropEqHeld	Sum of fair value of outstanding and unvested restricted stock plus Black-Scholes value of outstanding unexercised options held by an executive divided by the total compensation paid to that executive
Current equity-based compensation composition	PropEqGranted	Sum of grant-date value of restricted stock plus Black-Scholes value of options granted to an executive divided by the total compensation paid to that executive
Component proportion of compensation devoted to option pay		
Current option-based compensation	PropOptGranted	Sum of Black-Scholes value of options granted to an executive divided by the total compensation paid to that executive

Variable	Proxy	Calculation
Pension choice controls		
Earnings management activity	Discretionary accruals	Net income before extraordinary items plus depreciation and amortization minus operating cash flow, scaled by total assets
Employee loyalty vs. mobility	Employee impact	Net income growth from the previous year divided by the number of employees, in thousands
Union presence	Collective bargaining dummy	Indicator variable equal to one if the firm is subject to collective bargaining agreements; zero otherwise
Cash flow variability	Cash flow variance	Variance of cash flows in ten years' prior to the observation year
Plan tax status	Marginal tax rate	Marginal tax rate from John Graham's database
Firm-level controls		
Firm size	Sales	Net sales
Firm performance	Market to book ratio of assets	Total assets minus book value of equity plus market value of equity, scaled by total assets
Firm growth prospects	Return on assets	Net income divided by total book value of assets
Liquidity	Cash flow	Income before extraordinary items plus depreciation & amortization plus deferred taxes minus increase in current assets plus increase in current liabilities

Stock price effect	Lagged stock return	Change in price from fiscal year-end two years prior to the previous year's fiscal year-end divided by two year prior fiscal year-end price

Table B.2 - Annual Averages of Executive Compensation Variables

This table contains annual averages of the explanatory variables of interest, both for the CEO (Panel A) and for the top executives of a firm in aggregate (Panel B). This information was obtained from Compustat's Execucomp Database, which covers publicly-traded firms in the S&P 1500 index, although firms that are dropped from the index remain in Compustat thereafter.

	Panel A: Chief Executive Officers				*Panel B: Top executives (in aggregate)*			
Year	Proportion of equity-based pay held (%)	Proportion of equity-based pay granted (%)	Proportion of options granted (%)	Proportion of restricted stock granted (%)	Proportion of equity-based pay held (%)	Proportion of equity-based pay granted (%)	Proportion of options granted (%)	Proportion of restricted stock granted (%)
1992	49.3	25.7	20.5	5.2	46.3	26	19.6	6.3
1993	53.9	27.4	22.4	5.1	51.9	27.4	21.7	5.7
1994	49.4	32.1	26.7	5.3	47.5	31.6	25.7	5.9
1995	56	28.2	23.3	4.9	53.6	29.4	23	6.4
1996	62.1	34.8	29.2	5.6	58	34.2	27.9	6.3
1997	66.9	35.4	29.8	5.6	64.5	36.7	29.7	6.9
1998	61.2	39.6	33.3	6.3	58.7	40.9	32.3	8.6
1999	56.5	43.8	38.4	5.5	55.4	45.6	38.2	7.4
2000	57.9	44.4	39.1	5.3	56	45	38.6	6.4
2001	65.2	48.3	41.6	6.7	62.7	48.5	41.2	7.2
2002	54.5	44.4	37	7.4	51.1	44.1	35.5	8.7
2003	69.3	40.3	30.5	9.8	65.8	39.8	29.4	10.5
2004	70	42.6	28.7	13.9	67.8	42.8	28.1	14.7
2005	66.9	40.7	25.8	14.8	65.3	39	24.1	14.9
2006	69.9	41.8	20.7	21.1	67.3	41	20	21
2007	46.1	44.4	20.5	23.8	42.3	41.9	19.1	22.8