

*Company Stock in Pension Funds*

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## Abstract

This study examines several issues surrounding the tendency for some pension funds to invest in their own company's stock. After reviewing the existing literature describing the benefits and costs of investing in company stock, the legislative environment surrounding company stock holdings is reviewed. Using data from Internal Revenue Service Form 5500 filings on the pension fund holdings of over 300,000 defined-contribution pension plans in the 1990s, we show that about one out of ten defined-contribution plans invest in their own stock, but about one-third of workers in defined-contribution plans have some company stock in their pension plan. Pension funds are shown to be less likely to invest in company stocks that lead to higher risk that financial markets do not reward. We also find that pensions that hold a larger share of assets in company stock earn a higher average return and a higher variance of returns.

## I. INTRODUCTION

"If I had not been so loyal to the company and left all of my 401(k) in Enron stock, if I'd diversified, then I would be in a lot better shape than I am now."

-- Enron retiree.

As a result of several highly publicized corporate scandals and the ensuing erosion of stock prices that cost employees a large share of their retirement savings, private investors and legislators are increasingly questioning the wisdom of pension plans investing in company stock. Legislators have proposed limits on pension fund holdings of employer stock and mandates that would give workers the right to diversify out of employer stock over time.

Careful evaluation of legislative proposals requires an understanding of why firms and their employees invest in company stock. If investments in company stock improve the efficiency of the employment contract and benefit both the employer and the worker, it is difficult to argue that restrictions are desirable. If, on the other hand, company stock holdings are the result of irrational (or misinformed) behavior on the part of the employee, or the unintentional consequence of tax or pension law, the case for restrictions is much stronger.

In this study, we consider issues relevant to the debate on the merits of allowing pension funds to invest in company stock. First, we review the benefits and costs associated with a pension fund investing in employer stock and the relevant empirical evidence. Legislation currently regulating employer stock holdings in the various types of retirement plans is then discussed. This is followed by a description of the extent of employer stock holdings, empirical evidence on factors that influence the level of holdings, and estimates of how company stock holdings influence the trade-off between investment risk and return.

## II. THE BENEFITS AND COSTS OF COMPANY STOCK HOLDINGS

To organize the discussion of the factors influencing whether a pension fund holds company stock, we use a simple model comparing the benefits and costs of the decision. To understand the factors influencing the decision, it is important to recognize that, in some cases, the employer decides whether to invest in company stock whereas in other cases, the employee makes the decision.

According to a report by the U.S. Department of Labor, Advisory Council on Employee Welfare and Pension Benefits Plans (1997), there are essentially three models of investment in employer assets for defined-contribution (DC) plans -- the sponsor investment model, the directed match model, and the participant investment model. In the sponsor investment model, an investment manager makes the investment decisions for the participants. The sponsor is bound by Employee Retirement Income Security (ERISA) fiduciary requirements, but may choose to invest some or all of the contributions in employer securities.

In the directed match model, the participant chooses how to invest employee contributions, but all or some of the employer contributions are made in the form of company stock. Evidence suggests that approximately 7 percent of 401(k) plans match with company stock and that the practice is more common in larger plans.

In the participant investment model, the employee chooses among a series of investment options and company stock can be one of them. Evidence suggests that approximately 30 percent of 401(k) plans offer company stock as an option.

In our initial discussion, we assume that the employer decides whether to invest in company stock as in the sponsor investment and directed match models. Later, we consider the

participant investment model where workers make the asset allocation decisions but firms decide whether to make company stock one of the investment options.

From the firm's perspective, there are several benefits and costs to investing pension assets in company stock. One of the most commonly cited benefits of holding company stock is that it improves employee productivity by strengthening the link between employee compensation and firm performance. The free-rider problem makes many writers skeptical of any productivity effects. The free-rider problem emerges because if one worker increases work effort and firm profits rise as a result, all stockholders benefit equally from her additional efforts. The worker who increased work effort gets only a small share of the return to her additional efforts. Some authors have argued that despite the free-rider problem, productivity effects could be significant for two reasons. First, stock ownership could increase the incentives for peers to monitor each other. Second, stock ownership could make group decision making more productive.

There is mixed evidence on whether employee stock ownership (either through a pension or other means) enhances the value of the firm. For example, Pugh, Oswald, and Jahera (2000) report that employee stock ownership provides, "at best, a short-term boost to corporate performance." On the other hand, Jones and Kato (1993, 1995) find that employee stock ownership can increase worker productivity by 4 to 7 percentage points. Other studies suggest that the impact of employee stock ownership differs depending upon the firm's motivation for introducing the ownership plan. Gamble (1999) shows that employee stock ownership plans added prior to the tax incentives for Employee Stock Ownership Plans (ESOP) in 1986 had positive effects on firm performance, whereas those added after 1986 had much smaller effects. Gordon and Pound (1990) find that when employee stock ownership is used to avert a hostile

take-over, it damages firm financial performance. On the other hand, if employee stock ownership is structured so that employees do not have voting power, it has a significant positive effect on firm performance.

Another benefit of a pension fund holding company stock is that it can lead to favorable tax treatment. A corporation normally receives no tax deduction for dividends paid to stockholders. However, if the stocks are held in an ESOP, dividends are deductible. Consistent with the premise that the tax advantage is an important consideration, Brown, Lang, and Weisbrener (2003) find that higher dividend yields make it more likely that a company provides matching contributions in 401(k) plans in the form of company stock.

By transferring ownership from other stockholders to employees, employee stock ownership can be used to deter a hostile take-over. This result assumes that employees have a higher reservation price for selling to a bidder than the marginal investor and thus drive up the cost of a take-over. Several empirical studies support the premise that employee stock ownership is at least partly motivated by a desire to fend off take-over attempts. Chaplinsky and Niehaus (1994) show that ESOPs help fend off takeover attempts. Beatty (1994) shows that ESOP incidence rises with the probability that a firm will be a takeover target. More recently, Rauh (2003) shows that when a state passes a law that provides takeover protection to corporate managers, employee ownership of firms incorporated in that state falls.

Another reason that firms may prefer to purchase company stock over other assets is that it may be a low cost alternative. If, for example, the company issues new shares of the company stock to cover its contributions to the pension, it can avoid brokerage or management fees that would accompany other stock or mutual fund purchases. The contribution is not costless, however, because new shares of the stock dilute the value of the original shares.

Another reason the firm may prefer to issue company stock over purchasing other assets is that it may be less costly than borrowing through equity or bond markets if the firm is cash-strapped (Mitchell and Utkus 2002).

While there are several advantages to companies investing pension funds in their own stock, there are some major disadvantages as well. First and foremost, an investment in company stock may cause workers to undervalue contributions to the pension. If a worker places only \$.60 of value on \$1 of company stock, the firm will have to provide a compensating differential to workers to maintain a competitive compensation package. Unless the benefits described earlier are large enough to offset the cost of the compensating differential, profit-maximizing employers would not invest pension funds in company stock.

The size of the compensating differential required for mandating investments in company stock depends upon two factors -- the risk tolerance of the worker and the risk and return characteristics of the company stock. If allowed to allocate their pension assets freely, workers will choose a portfolio of assets yielding a level of risk and return consistent with their own preferences. Moreover, this portfolio would be chosen somewhere on the efficient frontier such that risk is minimized for any given level of expected return.

There are two distinct factors that determine the size of the compensating difference. A mandatory investment in company stock forces workers to choose a portfolio that is (1) inside the efficient frontier; and (2) inconsistent with their risk preferences. Figure 1 provides an illustration of these two effects.

Curve I is an indifference curve reflecting a typical worker's willingness to trade between risk and return on a portfolio. Curve F is the efficient frontier which illustrates for each level of

risk the maximum possible expected return. The point A represents utility maximizing behavior given the combination of worker preferences and the efficient frontier.

Suppose that an investment in company stock increases portfolio risk from  $\sigma_1$  to  $\sigma_2$ . Because some of the risk associated with the single stock could be avoided with diversification, the worker could achieve a higher expected return for the same level of risk. Consequently, holding risk constant at  $\sigma_2$ , the worker could increase expected returns by  $(r_c - r_b)$  with a diversified portfolio. For future reference, this part of the inefficiency of holding company stock will be referred to as the non-diversification cost.

Even if there was zero non-diversification cost and the company stock placed the worker on the efficient frontier facing expected return  $r_c$  and risk  $\sigma_2$ , this combination of risk and return does not match his risk preferences. He would prefer point A, which has both lower risk and lower expected return. Consequently, even if holding company stock keeps the worker on the efficient frontier, the firm may have to compensate the worker for the high level of risk. For example, assuming zero non-diversification cost and a stock with risk  $\sigma_2$  (i.e. Point C in figure 1), the firm would have to increase the expected return by  $(r_d - r_c)$  to compensate the worker for accepting a risk/return combination that deviates from his unconstrained choice.

Meulbroek (2002) uses the capital asset pricing model (CAPM) to show that the non-diversification cost of investing entirely in a single stock can be estimated by the following expression:

$$(1) \quad NDC_j = \left[ \frac{\sigma_j}{\sigma_m} - \beta_j \right] (r_m - r_f) = \left( \frac{\sigma_j}{\sigma_m} \right) (1 - \rho_{jm}) (r_m - r_f)$$

Where  $\sigma_j$  and  $\sigma_m$  represent the standard deviation of returns on stock  $j$  and the market portfolio, respectively;  $\beta_j$  is the beta coefficient corresponding to stock  $j$ ; and  $r_m$  and  $r_f$  represent the expected return on the market portfolio and the risk free asset respectively. The fact that  $\beta_j = \rho_{jm} (\sigma_j / \sigma_m)$  where  $\rho_{jm}$  is the correlation coefficient between the returns on stock  $j$  and the market portfolio leads to the second equality.

Meulbroek provides estimates of non-diversification cost for a combination of Value-Line firms and stocks included in an internet index. Her estimates suggest that if a worker was forced to invest 100% of assets in company stock, the average non-diversification cost would be 9 percent. That is, if 100% of assets were in company stock, the expected return could be increased by 9 percentage points with no change in risk by diversifying assets and picking a risk/return combination on the efficient frontier. This estimate of non-diversification cost will be overstated if workers hold only a fraction of their pension assets in company stock, or have assets other than company stock outside of their pension fund.

With the above, it is clear that stocks will differ in terms of the extent to which they expose workers to risk for which they are not rewarded. In one extreme, if a stock's returns are perfectly correlated ( $\rho_{jm}=1$ ) with the returns on the market portfolio, the worker cannot improve his expected return for the given level of risk by investing in a more diversified portfolio. On the other extreme, if a stock's returns are perfectly negatively correlated with the market portfolio, the worker is exposed to risk that is not rewarded and non-diversification costs are very high indeed.

Other studies follow different approaches to evaluating the non-diversification cost of holding company stock. Ramaswamy (2002) estimates the premium for an option contract guaranteeing the better of the rate of return on a typical company stock or the rate of return on a

well-diversified portfolio. For a typical company stock, this option would cost \$178 for each \$1000 of stock held for a one-year term. The cost would rise to \$303 for a three-year term.<sup>1</sup>

Brennan and Torous (1999) use simulation methods to derive an estimate of the inefficiencies of holding company stock. Assuming that workers exhibit constant relative risk aversion, Brennan and Torous use simulation approaches to compare the utility a worker would realize with a portfolio invested entirely in a randomly drawn security with that associated with a portfolio invested entirely in a risk-free asset. Their estimates suggest that, over a ten year period, 36 cents invested in a risk free asset would generate the same level of utility as one dollar invested in a randomly chosen security.<sup>2</sup>

Some researchers point out that holding an employer's stock is riskier than implied by the above estimates if the return on the company stock is positively correlated with the worker's wages. In fact, Cohen (2003) extends the work by Meulbroek to incorporate the correlation between labor income and company stock. However, there is surprisingly little evidence that a positive correlation exists. Davis and Willen (2000) find little correlation between occupation specific income risk and aggregate asset returns, but do find some evidence of positive correlation between occupation-specific income shocks and industry-specific asset returns.

The aforementioned estimates of non-diversification costs would be overstatements of the problem if workers have other assets, either inside or outside the pension, that would help lower the risk of holding company stock. Consequently, one would expect that that high income workers who are more likely to have assets outside their pension would be more willing to take

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<sup>1</sup>The typical stock has beta of unity. The standard deviation of annual returns is 18 percent for the benchmark portfolio and 48 percent for company stock.

on the risk of holding company stock as would workers who have supplemental coverage through a defined-benefit (DB) plan or another DC plan.

In summary, the firm is faced with numerous benefits and costs to investing pension funds in company stock. The benefits of investing in company stock include incentive effects for workers, tax advantages of paying dividends into ESOPs, lower administrative costs of purchasing company stock, and the ability to defend against hostile take-over attempts. The cost of investing in company stock is that employees may discount the employer contributions to the pension plan and the firm may have to provide a compensating differential. The size of this compensating differential will depend upon the financial characteristics of the stock, the risk aversion of the workers, and whether workers have other assets that can be used to diversify away the risk of the company stock.

The above discussion presumes that the employer decides whether to invest pension funds in company stock. Given the earlier discussion suggesting that investment in company stock is inefficient, the fact that employees voluntarily invest their own funds in company stock is somewhat surprising.

Several of the explanations for employees preferring stock over a diversified portfolio require an appeal to employees making irrational financial decisions. For example, John Hancock Financial Services (2001), the Vanguard Group (2002), and Benartzi (2001) find evidence that workers rate their employer's stock as less risky than holding an equity mutual fund, whereas other stocks are rated as more risky. Employee familiarity with their employer's

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<sup>2</sup> This estimate depends upon the degree of risk aversion assumed. A more risk averse worker would be willing to accept less than 36 cents of the risk free asset in exchange for the \$1 in a randomly chosen stock.

company may make them overconfident since there is some evidence of a “familiarity bias”.<sup>3</sup>

Another reason that employees might choose to invest their own funds in company stock is that they may view the employer’s decision to include it as an investment option as an endorsement of the stock. For example, Benartzi (2001), Liang and Weisbrenner (2002), and Brown, Lang, and Weisbrener (2003) all report that, counter to principles of diversification, when the employer matches employee contributions with company stock, the employee increases their own purchases of company stock.<sup>4</sup> There is also evidence that employees place too much weight on recent stock performance when making decisions regarding purchases of company stock [Benartzi (2001), Sengmuller (2002) and Choi et al. (2004)]. If employees are particularly cognizant of their employer’s stock performance, they may over-purchase shortly after the stock outperforms the market. This could have long lasting effects given that employees rarely reallocate their portfolios or their contributions [Samuelson and Zeckhauser (1988) and Ameriks and Zeldes (2001)]

Naive diversification strategies could also lead to over-investment in company stock. Benartzi and Thaler (2001) find that some investors follow a “1/n strategy” which allocates contributions equally between the n investment options available in the pension plan. Consequently, if company stock is one of four options, the naive approach would devote one-fourth of contributions to company stock.<sup>5</sup>

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<sup>3</sup> Meulbroek (2002) cites several studies showing that this bias extends beyond the stock issued by a person’s employer to companies located in their own geographic area.

<sup>4</sup> Benartzi also uses survey evidence to show that this endorsement effect applies to other investment alternatives. For example, some people indicate they would increase their own purchases of international stock if the employer matched employee contributions with international stock.

<sup>5</sup> Liang and Weisbrenner (2002) find evidence that employees illustrate 1/n behavior in choosing how much to invest in company stock.

Given employers may benefit when their workers hold company stock, one might expect that a firm would always include company stock as one of the investment options when it gives workers control over asset allocation. There is at least one reason the firm may not make the stock available. While section 404(c) of ERISA protects employers from liability as a fiduciary when workers are given control over asset allocation decisions, the firm is still required to choose a prudent mix of investment alternatives.<sup>6</sup> It is unclear whether 404(c) protects a firm when the company stock performs poorly. Some lawsuits have charged that employers breached fiduciary responsibility by failing to disclose to plan participants that the stock was not a prudent investment.<sup>7</sup>

### III. REGULATIONS AFFECTING COMPANY STOCK HOLDINGS

The ERISA Act of 1974 and subsequent amendments impose several restrictions on company stock holdings in pension plans. The nature of the restriction depends upon the type of plan.

Mitchell and Utkus (2002) provide a good historical review of how the limitations evolved over time. When ERISA was passed, the majority of pension plans in the U.S. were DB plans. DC plans were much less common and were often profit sharing or employee stock ownership plans that were supplemental to DB plans.

Since the federal Pension Benefit Guaranty Corporation would be liable for DB liabilities if a firm goes bankrupt, Congress chose to mitigate the moral hazard problem of sponsors

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<sup>6</sup>See Purcell (2002) for a good discussion of 404(c) compliance and protections.

investing in their own stock and imposed a 10 percent limit on DB plan holdings of company stock. Some argued that the same limit should be placed on DC plans at the time, but proponents of employee stock ownership objected to the limits. In the end, no limit was placed on company stock holdings in DC plans.

Over time, the DB plan was gradually replaced by the DC plan as the most popular form of pension and the share of pension wealth invested in company stock rose over time. ERISA was amended to address concerns with the increased exposure to company stock risk.

With the Tax Reform Act of 1986, Congress added legislation requiring the ESOP plans allow workers to begin diversifying out of company stock when they are 55 years old and have 10 years of service. The plan must offer at least three investment alternatives to the company stock and over a five year period allow the employee to shift at least 50 percent of assets into investments other than company stock. The diversification requirements apply to ESOP plans but exempt other types of DC plans.<sup>8</sup>

Passage of the 1997 Taxpayer Relief Act prohibited employers from mandating that employees invest more than 10 percent of their own contributions in company stock unless the employees could reallocate those investments. The rule did not apply to ESOP plans and did not prohibit workers from holding more than 10 percent in company stock voluntarily. The rule also did not prohibit employers from directing employer contributions (as a match or otherwise) into company stock.

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<sup>7</sup> Banham (2001) discusses a lawsuit against Lucent Technologies alleging a breach of fiduciary responsibility.

<sup>8</sup> For further details, see EBRI (1997), p. 106.

With the recent spate of employees experiencing catastrophic pension losses due to precipitous declines in stock value, a flurry of legislative proposals have emerged to further limit company stock holdings. Purcell (2002) reviews several of the proposals. The Pension Security Act of 2002 includes a provision to allow plan participants to sell company stock holdings no more than 3 years after they receive it. The Protecting America's Pensions Act of 2002 would prohibit employers from requiring that any elective employee contributions to a non-ESOP plan be invested in company stock; and mandate that employees be able to sell company stock purchased with employer contributions within three to five years. The Joint Committee on Taxation (2002) describes various types of legislation that could be used to restrict company stock holdings in pension plans. Some variations on the proposed limits include whether ESOP plans are exempted, whether employer contributions are treated differentially, and whether a limit should be placed on employees in terms of their voluntary purchases of company stock through the pension plan.

#### IV. EVIDENCE ON THE LEVEL OF COMPANY STOCK HOLDINGS

In this section, we use data from Internal Revenue Service Form 5500 filings between 1990 and 1998 to describe the extent of company stock holdings in U.S. pension plans. The sample is restricted to DC plans with 100 or more participants. This leads to a sample of 332,711 plans over the nine year period.

Table 1 provides several different perspectives on company stock holdings for the aggregation of data over the nine-year period. First, only 10.6 percent of DC plans report that they hold some company stock in their portfolio. Second, because the pensions that hold

company stock are larger than average, the pension plans that hold company stock cover 35.3 percent of the pension plan participants in the sample. Among the plans that hold company stock, the average plan had 53.7 percent of its assets invested in company stock. Together, these statistics suggest that a small minority of pensions invest in company stock, but these pensions are larger than average. Moreover, when a plan invests in company stock, on average, it allocates nearly one-half of all assets to the stock.

Table 1 also presents time series evidence on company stock holdings over the 1990-1998 period suggesting a modest decline in company stock holdings among pension plans. Over the 1990-1998 period, there was a 2.8 percentage point decline in the percentage of plans with some company stock holdings and a 1.4 percentage point decline in the percentage of participants covered by plans with company stock. Also, among plans with some company stock in their pension portfolio, there was a 5.1 percentage point decline in the average share of assets invested in company stock. While it is tempting to conclude from these statistics that during the 1990s firms became slightly more reluctant to invest in company stock, it is important to recognize that there was a large increase in the number of DC plans over the period. Consequently, the trends could merely reflect the changing composition of DC plans over time.

Table 2 contrasts several pension features depending upon whether the plan holds any company stock. A few points can be drawn from this. First, the advantages of ESOP status (i.e., anti-takeover and preferential tax-treatment) are not the only reason that firms invest in company stock. Only about one half of the plans with company stock report ESOP status. Moreover, while 47.8 percent of the pensions that hold some company stock are 401(k) plans, only 8.7 percent make their 401(k) plan a KSOP by adding ESOP status to the portion of the plan that holds the company stock. This suggests that the tax advantages of the ESOP status are not

the most important reason for investing in company stock. Many plans see investment in company stock desirable on its own merits.

On average, the pension plans that hold company stock have nearly five times as many participants as those that do not hold company stock. This is not all that surprising since many of the smaller plans will be associated with non-incorporated firms. Plans that hold company stock are also less likely to give participants control over asset allocation. While 56.7 percent of the plans that do not hold company stock have participant direction of assets, only 35.5 percent of plans that hold company stock provide the option.

While the total contributions per participant are virtually identical in plans with and without company stock (\$2,282 and \$2,172 respectively), the plans with company stock have much higher assets per participant (\$27,619 versus \$18,469). Plausible explanations for this pattern are that the plans with company stock are either more mature plans (i.e. have workers who have been in the plan for a longer number of years), or that they have achieved much higher returns on their investments.

The relationship between the return on plan assets and company stock holdings is provided in table 3. For all plans over the 1990-1998 time period, the mean and median rate of return on assets was 11.7 and 11.0 percent, respectively. The standard deviation of returns across plans was 8.0 percent.

Given that investing in a single stock is risky, it is not surprising that the standard deviation of returns across plans rises as the share of assets invested in company stock grows. Breaking the data into four categories reflecting their level of company stock holdings reveals that the standard deviation of returns across plans is lowest for plans with no company stock (7.5 percent) and highest for those with over two-thirds of their assets in company stock (14.1

percent). The higher risk is rewarded with only a slightly higher return. For example, compared to the funds with no stock, the mean return on funds with company stock comprising two-thirds or more of the portfolio is 0.3 percentage points higher and the standard deviation of returns is 6.6 percentage points higher.

Among plans holding company stock, approximately 40 percent of the plans hold non-traded stocks. These non-traded stocks are disproportionately held in smaller pension plans. The mean number of participants in plans is 1,213 for plans with non-traded stock and 4,185 for plans with publicly-traded stock. Plans that hold non-traded stock earn a 2.5 percentage point lower average return than plans that hold publicly traded stock (10.7 versus 13.2 percent) and the standard deviation of returns is 1.0 percentage points lower (11.2 versus 12.2 percent).

To understand how the risk and return characteristics of a company's stock affect its decision to invest in company stock, pension plan information from Form 5500 is merged with returns on the corresponding company stock from CRSP using identifiers issued by the Committee on Uniform Security Identification Procedures (CUSIP).<sup>9</sup> Since many pension plan sponsors are not publicly traded, nearly 300,000 plan filings are dropped because no CUSIP is available. Of the firms with a CUSIP, approximately 13,000 cannot be found in the CRSP data.<sup>10</sup> The end result is that 18,381 pension filings for publicly traded companies can be matched with CRSP data.

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<sup>9</sup>A detailed description of CRSP data is available at <http://gsbwww.uchicago.edu/research/crsp/>. A description of the CUSIP numbering system is available at <http://www.cusip.com/>. Since the CUSIP for a corporation may change over time, we use the CRSP data to determine the CUSIP for a corporation during the month and year of the Form 5500 filing. The PERMNO of that corporation is then used to access data on prior returns and prices.

<sup>10</sup>The CUSIP number on Form 5500 data identifies a security issuer. The CUSIP in CRSP identifies the security issuer and each specific security issued (e.g. a given company may issue several different types of stock or bonds). When a given CUSIP issuer can be matched to

For each stock in the matched sample, daily returns from the past year are used to estimate the standard deviation of daily returns, the stock's beta coefficient, and the estimate of non-diversification cost described earlier. The results are summarized in table 4.

The non-diversification cost of holding company stock in pension plans is very high. Using Meulbroek's approach, we estimate that if all assets were held in company stock, the plan could increase its returns by 30.6 percentage points with no increase in risk by choosing a portfolio on the efficient frontier. This estimate of non-diversification cost is much higher than the 9 percentage points found by Meulbroek. The best explanation for the difference is that Meulbroek's study is based on data for a sample of approximately 1,500 Value-Line stocks. Our data includes a much larger sample of stocks and is more likely to include small and medium cap stocks. Consistent with this explanation is the fact that non-diversification costs are estimated to be only 13 percent for firms in the top one-third of the market capitalization distribution, 24 percent for firms in the middle one-third, and 54 percent for firms in the bottom one-third.

Compared to holding the CRSP market weighted portfolio, the company stock of firms with DC plans offers a higher risk and return. Over the 1990-98 time period, the mean returns on company stock and the market index are 18.2 and 17.5 percent, respectively. The standard deviation of daily returns is nearly four times higher for company stock than the market index (2.6 versus 0.7 percent).

To determine the importance of the stock's financial characteristics on the pension fund holdings of the stock, an OLS model of the share of assets invested in company stock is estimated with controls for the stock's non-diversification cost, beta, and dummy variables

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several different securities in CRSP, the financial characteristics of the security with the largest market value is chosen to describe the company stock.

controlling for the size of the plan and the company's market capitalization.<sup>11</sup> Beta was estimated using the daily returns on the company's stock in the year prior to the Form 5500 filing.<sup>12</sup> The results, presented in the first column of table 5, imply that the stock's non-diversification cost and beta both have a statistically significant negative effect on company stock holdings. A one standard deviation increase in non-diversification cost (.44) would reduce the share of assets invested in company stock by 2.0 percentage points. A one standard deviation increase in beta (.60) would reduce stock holdings by 4.3 percentage points. When a stock has higher non-diversification costs or a higher level of market risk, pension funds respond by investing less in the stock.

Since ESOP status provides firms special tax advantages and may also insulate them from charges of breaching fiduciary responsibility by investing in company stock, ESOP plans may respond differently to the financial risks of holding company stock. To examine this, separate regressions were estimated for plans depending upon whether they report an ESOP feature. The results, reported in the last two columns of table 5, indicate that only non-ESOP plans exhibit a statistically significant response to non-diversification costs. Both types of plans, however, hold less company stock when the stock's beta is higher. Another interesting contrast between the two types of plans is that the number of participants has a significant effect on company stock holdings only for non-ESOP plans. Apparently, ESOP status dampens the

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<sup>11</sup> The controls for size of plan and market capitalization are dummy variables indicating whether the pension plan is in the top, middle or bottom one-third of the sample in terms of number of pension participants and market capitalization.

<sup>12</sup> The formula for calculating beta is described below equation (1).

effect of risk considerations on company stock holdings. This result could be relevant to the question of whether ESOP plans should be exempt from regulations on company stock holdings.

One final issue we consider is the extent to which company stock holdings affect the overall risk and return of company pension plans. We employ a very simple regression strategy which simultaneously estimates the mean and standard deviation of a pension plan's rate of return as a linear function of the share of assets held in company stock. The estimated results imply that a 10 percentage point increase in the share of assets invested in company stock increases the mean return by .54 percentage points and the standard deviation of returns by 1.6 percentage points. Hence, company stock holdings expose pension participants to both increased risk and return. The obvious but unanswered question is whether the additional return justifies the additional risk.

## V. SUMMARY AND CONCLUSIONS.

The practice of investing pension funds in company stock has become increasingly scrutinized by policy-makers and pension participants. This study has provided a review of the underlying motivations for investing in company stock. Existing literature suggests that pension investments in company stock are motivated by the incentive effects provided by employee ownership, tax advantages offered by ESOP plans, and the ability to use employee ownership to fend off a hostile take-over attempt. The most compelling argument against allowing pension funds to invest in company stock is that it exposes workers to risk without a commensurate increase in expected returns.

The empirical evidence presented here illustrates that nearly 90 percent of DC plans hold no company stock. However, because company stock is much more common in large pensions, almost 35 percent of pension participants have some company stock in their pension. Moreover, when a pension chooses to invest in company stock, the average plan holds slightly over one-half of the assets in that stock.

Using financial data on company stock held in pension plans, we find that pension funds are less likely to invest in company stock when the stock's risk attributes are unfavorable. In particular, pension funds are less likely to invest in a company stock that has a high non-diversification cost. That is, if a stock has a high variance of returns without a commensurate increase in expected returns, the company's pension plan is less inclined to invest in the company stock.

While investing in a single stock can be risky, many pensions will have other assets in the pension to help offset the risk. Nevertheless, our estimates suggest that a 10 percentage point increase in the share of assets in company stock is associated with a 1.6 percentage point increase in the standard deviation of returns and a .54 percentage point increase in mean returns. The obvious question is whether this is a reasonable increase in return for the additional risk.

Overall, there are many unresolved questions relevant to the wisdom of pension investments in company stock and whether government regulation of such practices is appropriate. For example, to what extent are the risks of holding company stock compounded by a positive correlation between the returns on the company stock and a worker's wages? Do workers offset some of the risks of holding company stock with appropriate management of their other pension and non-pension investments? Do the positive incentive effects of employee ownership justify the potential efficiency losses from investing in company stock? Finally, do

workers with company stock receive extra compensation for their exposure to the risk of holding company stock? Additional research on these and other questions is necessary for designing appropriate public policies with respect to pension holdings of company stock.

TABLE 1  
COMPANY STOCK HOLDINGS

Year	Percent of Plans with company stock	Percent of Participants with company stock	Among plans with company stock, share of assets invested in company stock	Sample Size
1990 to 1998	10.6%	35.3%	53.7%	332,711
1990	11.8%	36.0%	54.9%	28,676
1991	11.6%	37.0%	55.1%	29,424
1992	11.3%	36.6%	55.1%	32,566
1993	11.3%	36.1%	55.6%	35,410
1994	10.9%	35.7%	54.9%	35,529
1995	10.5%	34.6%	54.1%	38,416
1996	10.2%	33.5%	52.9%	41,697
1997	9.7%	34.8%	51.5%	43,947
1998	9.0%	34.6%	49.8%	47,046

TABLE 2  
CHARACTERISTICS OF PLANS WITH AND WITHOUT COMPANY STOCK\*

Variable	Plans without company stock	Plans with company stock	t-test of Difference
Percent ESOP	---	49.3%	---
Percent KSOP	---	8.7%	---
Percent 401(k)	72.1%	47.8%	-94.75
Percent Participant Directed	56.7%	35.5%	-76.43
Number of Participants	637	2,943	74.41
Employer Contributions Per Participant	\$1,142	\$942	-6.91
Employee Contributions Per Participant	\$1,030	\$1,340	1.28
Total Contributions Per Participant	\$2,172	\$2,282	10.45
Assets Per Participant	\$18,469	\$27,619	14.51
Sample Size	297,578	35,133	

<sup>a</sup> The sample sizes used for compute the means of contributions and the asset variables are slightly smaller due to missing data.

TABLE 3  
RATE OF RETURN FOR PENSION PLANS BY COMPANY STOCK HOLDINGS<sup>a</sup>

Group	Mean	Median	Standard Deviation	Sample Size
All	11.7%	11.0%	8.0%	308,030
No Company Stock	11.6%	11.0%	7.5%	277,967
1% to 32% Company Stock	11.8%	11.5%	8.9%	13,077
33% to 66% Company Stock	13.6%	12.0%	12.8%	5,438
67% to 100% Company Stock	11.9%	9.7%	14.1%	11,548
With Non-traded Company Stock	10.7%	9.4%	11.2%	11,855
With Traded Company Stock	13.2%	12.2%	12.2%	18,157
With Company Stock, < 300 Participants	11.1%	9.7%	11.7%	11,228
With Company Stock, 300 to 999 Participants	12.2%	11.2%	11.8%	8,486
With Company Stock, 1000+ Participants	13.4%	12.4%	12.0%	10,349

<sup>a</sup> Plans in the top and bottom 1 percentile of the return distribution have been deleted from the sample.

TABLE 4  
FINANCIAL CHARACTERISTICS OF STOCKS IN FORM 5500/CRSP SAMPLE<sup>a</sup>

Group	Non-diversification cost	Average Annual Rate of Return	Pension Plan Rate of Return	Standard Deviation of Daily Returns	Beta	Sample Size
All stocks with CUSIP	0.306	18.2%	13.5%	2.6%	0.748	18,381
Small Market Cap	0.544	11.3%	11.9%	3.8%	0.541	6,120
Medium Market Cap	0.243	21.6%	13.8%	2.3%	0.733	6,133
Large Market Cap	0.132	21.8%	14.8%	1.7%	0.970	6,128
Stocks Not Held in Pension Fund	0.345	17.7%	12.3%	2.8%	0.783	9,540
Stocks Held in Pension Fund	0.264	18.8%	14.8%	2.3%	0.710	8,841
CRSP Value-weighted index	--	17.5%	--	0.7%	--	--

<sup>a</sup> The Form 5500 data covers 1990 through 1998. The CRSP data is based on the prior year's daily returns. The returns on the CRSP Value weighted index are weighted by the number of pension plans holding company stock in each year.

TABLE 5  
DETERMINANTS OF SHARE OF ASSETS  
INVESTED IN COMPANY STOCK<sup>a</sup>

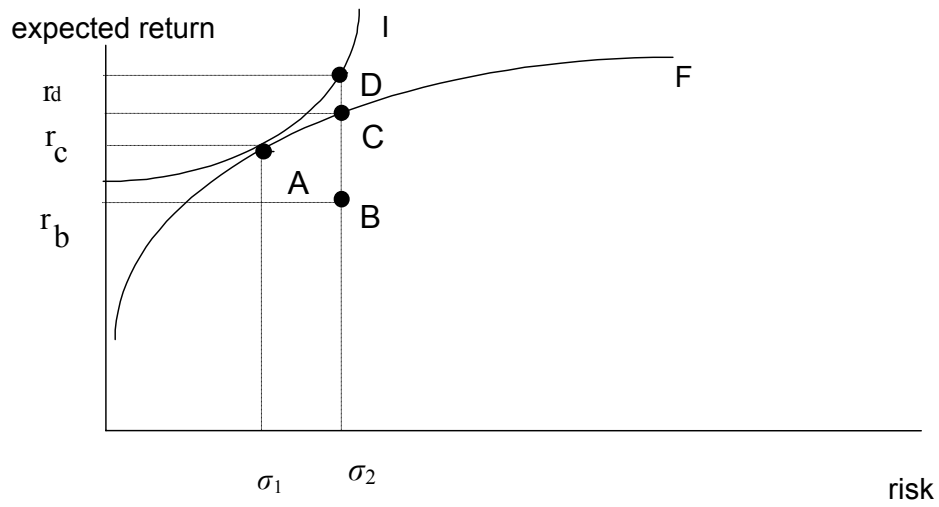
	All Pensions	Non-ESOP	ESOP
Constant	0.213 (29.53)	0.072 (14.22)	0.647 (32.46)
Number of Participants in Pension <sup>b</sup>			
300 to 899	0.011 (1.55)	0.010 (2.08)	-0.017 (0.81)
900 to 2,799	0.061 (8.24)	0.049 (9.49)	-0.018 (0.82)
2,800 or more	0.138 (17.05)	0.080 (14.01)	0.014 (0.59)
Non-Diversification Cost	-0.045 (7.34)	-0.023 (5.52)	-0.016 (0.88)
Beta	-0.071 (16.46)	-0.038 (12.70)	-0.044 (3.36)
Market capitalization <sup>c</sup>			
Medium	0.022 (3.43)	0.042 (9.19)	0.045 (2.50)
Large	0.044 (5.90)	0.093 (18.00)	-0.039 (1.79)
R-Squared	0.047	0.079	0.010
Sample Size	18,381	14,356	4,025

<sup>a</sup> Coefficient estimates are from OLS regression of percentage of pension fund assets invested in company stock on control variables listed. t-statistics are in parentheses.

<sup>b</sup> The cut-offs for the number of participants in the pension plan were chosen to approximately divide the sample into fourths.

<sup>c</sup> The market capitalization cut-offs were chosen to divide the sample into thirds.

Figure 1. Compensating Differentials for Risk in Company Stock.



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