WHEN DO COMPANIES FUND THEIR DEFINED BENEFIT PENSION PLANS?

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ABSTRACT

This paper extends the accounting academic literature on pension funding strategy by looking at a more recent data set, directly examining contributions to defined benefit pension plans, and considering the effect of changing economic conditions over time on pension plan funding. I find that the average funded status of defined benefit pension plans has changed over time in response to changing market conditions. In addition, managers respond to these changes differently depending on firm specific incentives to make contributions to their pension plans. I find that companies that have employees protected by unions, more costly plans, higher levels of cash from operations, higher levels of plan underfunding, tax incentives, and debt contracting incentives contribute more to their pension plans. In contrast, I find that companies with other investment opportunities for their free cash, and companies with pension plans assets earning higher returns contribute less to their pension plans. This paper has implications for regulators and standard setters considering how to deal with pension funding shortfalls, accounting professionals auditing companies with pension plans, CFOs determining their company's pension funding strategy, and investors and creditors evaluating the risks that companies with defined benefit pension plans are taking on.

JEL: J32, M41, M59

KEYWORDS: Accounting for Defined Benefit Pension Plans, Pension Plan Funded Status

INTRODUCTION

There has been a growing concern about the ability of corporations to provide retirement benefits to their employees. In recent years, there has been a shift away from the generous retirement benefits packages of the 1970s and 1980s towards defined contribution plans, such as 401(k) plans (Munnell and Soto 2007). However, some companies are still providing defined benefit pension plans (hereafter pension plans), which are more expensive on average, to their employees. In addition, companies that have reduced retirement benefits or closed participation in pension plans to new employees still face the costs of funding the plans for retirees whose benefits were protected from plan changes.

Companies regularly lobby Congress for pension funding relief. As an example, in 2004 Congress responded to pressure from large corporations with unfunded pension plans and changed the way that companies calculate the pension obligation for purposes of the legal funding requirements (Walsh 2004). More recently, AT&T has requested approval to contribute preferred equity to its pension plan in lieu of a cash contribution (Chasan 2013) and a coalition of companies and labor unions is petitioning Congress to change the law to allow the benefits of retired employees to be cut (Hicken 2013). This paper examines two related research questions about the funding of pension plans. First, how has the average funded status of the pension plans of U.S. publicly traded companies varied over time in response to changing market conditions? Second, what are the determinants of companies' pension plan funding strategies?

I first evaluate the average pension plan funded status for all U.S. publicly traded companies with pension plans during the period 1998 to 2006. The funded status of most pension plans should reflect current economic conditions because the benefit obligation should be measured using the yield on high quality

corporate bonds, and pension assets are largely comprised of stocks and bonds. As expected, I find that pension plans were overfunded on average in the late 1990s when the stock market was doing well, and became underfunded on average when the stock market declined in 2000, 2001, and 2002. To make up for this decline, companies have tripled their level of contributions over the 1998 to 2006 time period.

I next investigate the determinants of pension plan contributions. Based on a review of the literature, I identify several incentives that managers have to make or withhold contributions to their pension plans. I find that older companies, companies whose employees are protected by unions, and companies with more costly plans contribute more to their pension plans. Companies who are generating higher levels of cash from operations also contribute more to their pension plans. This is after controlling for other investment opportunities, which are associated with a lower level of pension contributions. Extreme underfunding triggers legal requirements to make up the shortfall, and I find that companies with more underfunded plans in the previous year contribute more in the current year. Finally, companies contribute more when they have tax incentives and debt contracting incentives to do so.

This paper makes several important contributions. First, it extends the accounting academic literature on pension funding strategy (see, e.g., Francis and Reiter 1987; Asthana 1999) by looking at a more recent data set, directly examining contributions to pension plans, and considering the effect of changing economic conditions over time on pension plan funding. Second, the findings of this paper should be of interest to regulators and standard setters considering how to deal with pension funding shortfalls. Third, the findings of this study are relevant to accounting professionals dealing with accounting for and auditing companies with pension plans, CFOs determining their company's pension funding strategy, and investors and creditors evaluating the risks that companies with pension plans are taking on.

The remainder of this paper is organized as follows. The next section reviews the literature. The following section describes the methodology, research design and sample selection. Next the results are reported and the final section concludes the paper.

LITERATURE REVIEW

Pension Plan Funded Status over Time

I first evaluate the average funded status of the pension plans of all U.S. publicly traded companies. The funded status is defined as the fair value of retirement plan assets less the expected liability or projected benefit obligation (PBO). The PBO is defined as the actuarial present value of future retirement benefits attributed to service rendered to date and should be based on estimated future events such as compensation increases, turnover, and mortality (Financial Accounting Standards Board (FASB) 1985). To estimate the PBO, management must make several assumptions, such as what the employees' salaries will be at the time of retirement, how long the employees are expected to live, and what the appropriate discount rate is to estimate the present value of the future benefits.

The funded status of most pension plans should reflect current economic conditions. Pension plans typically invest in a mix of stocks and bonds, and as the stock market grows or declines, pension plans realize gains or losses on the pension plan assets. I expect that the pension plan funded status will be positively related to stock market returns. In addition, the discount rate used to estimate the PBO should be based on the rate at which the retirement benefit could be effectively settled and should reflect the return on high quality fixed-income investments (FASB 1985). The Securities and Exchange Commission (SEC) staff considers securities receiving one of the two highest ratings given by a recognized ratings agency to be high quality (e.g., a rating of Aa or higher by Moody's Investors Service). I expect that the pension plan funded status will be positively related to the yield on high quality fixed-income investments (a higher discount rate results in a lower PBO and a higher funded status).

Determinants of Pension Plan Contributions

Although the Employee Retirement Income Security Act of 1974 (ERISA) requires a certain level of plan funding, companies have some flexibility due to things like the ability to make up funding shortfalls over a number of years (Munnell and Soto 2007). Companies may or may not choose to fully fund their pension plans depending on regulatory requirements, economic conditions, and company specific incentives. In this section, I identify five broad determinants of pension plan funding: firm characteristics related to the overall cost of the plan, financial constraints faced by the firm, the extent of underfunding, tax incentives, and opportunity costs.

Firms with more costly pension plans will have a higher PBO and will have to contribute more to the pension plan to maintain the same funding level as firms with less costly plans. I identify five indications of a more costly pension plan. First, defined benefit pension plans are more prevalent among larger, older companies. In the early 1980s, most workers with pensions were covered by defined benefit plans, and since that time there has been a shift towards defined contribution plans (such as a 401 (k) plan) (Munnell and Soto 2007). In addition, older companies are more likely to have a more mature workforce and may have to contribute more to older plans to cover the payments to retirees (Munnell and Soto 2007). I expect that larger companies and older companies will contribute more to their pension plans.

Another indication of a more costly plan is the presence of organized labor. Unions negotiate on the employees' behalf to obtain a good benefits package. In addition, companies with a significant union presence are less likely to freeze a retirement plan or reduce retirement benefits due to the difficulty of negotiating a plan freeze with the union (Munnell and Soto 2007; Atanasova and Hrazdil 2010; Comprix and Muller 2011). If a company can't reduce retirement benefits, then additional benefits will continue to accrue to the employees and additional contributions will have to be made. I expect that highly unionized companies will contribute more to their pension plans.

The cost of a pension plan is directly related to the number of workers employed by a company and the terms of the pension plan (i.e., the pension benefit formula). I expect that companies that increase the number of employees will contribute more to their pension plans. Conversely, companies that reduce the number of employees through restructurings or other activities should be able to contribute less to their pension plans. Finally, the overall cost of the pension plan should ultimately be reflected in the yearly pension expense. I expect a positive relation between pension expense and pension plan contributions.

Another determinant of pension plan funding is financial constraints faced by the company. One type of financial constraint is the level of leverage maintained by a company. Companies with high levels of leverage often face debt contracting issues in the form of debt covenant restrictions and performance pricing provisions (Duke and Hunt 1990; Press and Weintrop 1990; Asquith et al. 2005). In addition, large unfunded pension liabilities are associated with bond default risk and bond rating downgrades (Wang and Zhang 2013). Therefore, companies with a large amount of debt have incentives to fund their pension plans to prevent bond rating downgrades, as well as debt covenant violations and performance pricing triggers related to leverage ratios. I expect that highly levered companies will contribute more to their pension plans.

A second type of financial constraint relates to the ability to fund the pension plan through operating cash flows. Companies with strong operating cash flows have the resources to fund their pension plan, and pension plans are a good place to store internal funds because of favorable tax treatment (Francis and Reiter 1987). I expect a positive relation between pension expense and pension plan contributions.

The extent of underfunding is a third determinant of a company's pension funding strategy. Under ERISA companies are required to contribute to a pension plan when the level of funding falls below a certain

ratio, and companies with extreme underfunding are at greater risk of being subject to additional funding requirements (Munnell and Soto 2007). Due to the legal requirements to fund pension plans, I expect a negative relation between the extent of plan funding and pension plan contributions. In other words, companies with overfunded plans will contribute less and companies with underfunded plans will contribute more.

As discussed in the previous section, companies do not have complete control over the funded status of their pension plans due to changing market conditions. As market conditions improve, the pension plan assets earn a higher return on the invested stocks and bonds and the opposite occurs when market conditions deteriorate. As the funded status improves due to a higher return on plan assets, then companies will be obligated to contribute less of their operating cash. Therefore, I expect a negative relation between the return on pension plan assets and pension plan contributions.

A fourth determinant of pension plan funding is a company's tax incentives. Contributions to an employer sponsored pension plan are tax deductible for the company (Munnell and Soto 2007). Therefore, companies with higher marginal tax rates have a greater incentive to make contributions due to the tax deduction than companies with lower marginal tax rates (Francis and Reiter 1987). However, once the plan assets exceed a certain level of funding, any contributions made to the plan are not tax deductible (Asthana 1999; Munnell and Soto 2007). I expect that companies with underfunded plans and high marginal tax rates will contribute more to their pension plans.

Finally, companies have a finite amount of internally generated operating funds and retirement plan contributions divert resources from other investing opportunities. Rauh (2006) finds that companies with high capital expenditures contribute less to their pension plans. In other words, companies with investment opportunities to spend their money on are less likely to contribute to their pension plan once their minimum obligations are met. Therefore, I expect a negative relation between capital expenditures and pension plan contributions.

DATA AND METHODOLOGY

Sample Selection

I select a sample of U.S. companies with pension plans that have the necessary data for the 1998 to 2006 time period. The sample begins in 1998 because that is the year when data on pension contributions is available on Compustat, which allows the study to cover the entire universe of publicly traded companies with pension plans. In each regression, outliers were removed by excluding the top and bottom 1% of all continuous variables. The final sample has 6,945 annual observations and is comprised of 1,606 firms.

Research Design

In the previous section, I first discussed reasons why the funded status of pension plans is expected to vary over time due to changing economic conditions. I examine this empirically by looking at the average change in the funded status of pension plans over time, as well as the change in the PBO and plan assets. I compare this change to market information that is expected to be related to the pension plan funded status: the return on large company stocks, the return on long-term corporate bonds, and the yield on high quality corporate bonds.

I next identified several determinants of companies' pension plan funding strategy: firm characteristics related to the overall cost of the plan, financial constraints faced by the firm, the extent of underfunding, tax incentives, and opportunity costs. I use these determinants to develop the following regression model explaining pension plan contributions:

$$CONTR_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 FIRMAGE_{it} + \beta_3 UNION_{it} + \beta_4 \Delta EMP_{it} + \beta_5 COST_{it} + \beta_6 DEBT_{it-1} + \beta_7 CFO_{it} + \beta_8 FUNDSTAT_{it-1} + \beta_9 RETURN_{it} + \beta_{10} MTR_{it} + \beta_{11} CAPX_{it} + \sum_{j=0}^{7} \beta_{12+j} IND_j + \varepsilon_{it} \quad (1)$$

The dependent variable ($CONTR_{it}$) is the company contribution to the pension plan in year t, deflated by total assets. Included in each regression but not reported in the tables are dummy variables to control for industry differences at the one-digit SIC code level (IND_j).

The first five independent variables capture firm characteristics that are indications of the overall cost of the plan. Larger firms tend to have more extensive retirement packages. Firm size ($SIZE_{it}$) is defined as the log of the market value of equity. Older firms are expected to have a more mature workforce and more retirement age employees, and companies may have to contribute more to older plans to cover the payments to retirees. The age of the firm ($FIRMAGE_{it}$) is defined as the number of years that Compustat has reported information on the company. Companies with a significant union presence are more likely to provide generous retirement benefits and less likely to freeze a retirement plan. Following D'Souza et al. (2001), I define the variable $UNION_{it}$ as 1 if greater than fifty percent of the employees belong to a union, and 0 otherwise. Events like expansion or restructuring lead to growth or decline in the pension plan. I capture this using the change in the number of employees (ΔEMP_{it}), deflated by total assets. Finally, I define the overall cost of the plan ($COST_{it}$) as the average pension expense over the past two years, deflated by total assets. When pension plans are more costly, companies are expected to make larger contributions to cover the higher cost. Therefore, I expect a positive relation between company contributions ($CONTR_{it}$) and $SIZE_{it}$, $FIRMAGE_{it}$, $UNION_{it}$, ΔEMP_{it}, and $COST_{it}$.

The next two independent variables capture the financial constraints faced by the firm. I use the ratio of total liabilities to total assets ($DEBT_{it-1}$) as a measure of leverage. Beginning of the year leverage is used to capture the level of leverage before any contributions made that year. I expect that companies with a higher level of debt will contribute more to their pension plan to improve the funded status to improve or maintain bond ratings and manage performance pricing provisions. Therefore, I expect a positive relation between company contributions ($CONTR_{it}$) and $DEBT_{it-1}$. Average cash from operations over the past two years, deflated by total assets (CFO_{it}) captures the ability to contribute to the retirement plan out of operating income. I expect a positive relation between $CONTR_{it}$ and CFO_{it}.

$FUNDSTAT_{it-1}$ and $RETURN_{it}$ represent the extent of any underfunding as well as current economic conditions. The magnitude of any underfunding is captured by $FUNDSTAT_{it-1}$, which is the beginning of the year pension plan funded status less the amount recognized on the balance sheet, deflated by total assets. Companies are required by law to contribute to a pension plan when the level of funding falls below a certain ratio. When a plan is unfunded, $FUNDSTAT_{it-1}$ would be negative and I expect a negative relation between $CONTR_{it}$ and $FUNDSTAT_{it-1}$. The percentage return on pension plan assets ($RETURN_{it}$) captures a reduction in the need to fund the plan when the retirement plan assets earn a higher return. This variable also controls for the change in the funded status due to changing market conditions. I expect a negative relation between $CONTR_{it}$ and $RETURN_{it}$.

Until a certain funding level is reached, companies with higher marginal tax rates have a greater incentive to make contributions due to the tax deduction. The variable MTR_{it} is the marginal tax rate if the plan is underfunded, and 0 if the plan assets exceed the PBO. The marginal tax rate data was obtained from John Graham (see Graham and Mills 2008). I expect a positive relation between $CONTR_{it}$ and MTR_{it}.

Finally, firms with investment opportunities to spend their money on are less likely to contribute to their pension plan once their minimum obligations are met. To capture this, I include the average capital expenditures over the past two years, deflated by total assets ($CAPX_{it}$). I expect a negative relation between $CONTR_{it}$ and $CAPX_{it}$.

RESULTS AND DISCUSSION

Pension Plan Funded Status over Time

Table 1 reports descriptive information about the PBO, plan assets, funded status, company contributions, and return on plan assets over the period 1998 to 2006 for all firms in Compustat reporting pension plan information. The projected benefit obligation ranges from 5.03 million for firms in the tenth percentile to 1.8 billion for firms in the ninetieth percentile. This reflects both the obligation and the size of the firms in the sample. Firm size is controlled for in all future analyses. The median firm has an underfunded pension plan of 4.53 million. The extent of plan underfunding is larger than overfunding as can be seen by firms in the tenth percentile having plans underfunded by 172.56 million and firms in the seventy fifth percentile having plans that are just barely funded.

Table 1: Descriptive Information about the Funded Status

(in millions)	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile
PBO	5.03	18.79	95.00	440.88	1,851.46
Plan Assets	2.69	14.61	81.66	397.77	1,795.00
Funded Status	-172.56	-37.40	-4.53	0.93	62.00
Contributions	0.00	0.20	2.16	12.33	54.21
Return on Plan Assets	-7.81%	0.00%	5.63%	11.97%	17.28%

Shown is descriptive information about the funded status for the final sample of companies with pension plans over the period 1998 to 2006. The funded status is defined as the plan assets less the projected benefit obligation (PBO). Contributions are the amount that the company contributed to the pension plan and the return on plan assets is the actual % return that the pension plan assets earned.

Table 2 reports the average PBO, plan assets, and funded status each year over the 1998 to 2006 time period for all firms in Compustat reporting pension plan information. It also reports information on how much the firms contributed to their pension plans on average and what the average return on pension plan assets was. Finally, Table 2 reports information on the overall market conditions each year: the return on large company stocks, the return on long-term corporate bonds, and the yield on high quality corporate bonds.

Table 2: Funded Status of Defined Benefit Pension Plans over Time

	Average Across All Firms (in millions)					Market Information		
Year	PBO	Plan Assets	Funded Status	Contributions	Return on Plan Assets	Return on Large Company Stocks	Return on Long-term Corporate Bonds	Yield on High Quality Corporate Bonds
1998	765	842	77	16	6.3%	28.58%	10.76%	6.73%
1999	764	978	214	17	7.3%	21.04%	-7.45%	7.87%
2000	764	915	151	14	3.6%	-9.11%	12.87%	7.62%
2001	822	811	-11	13	-4.6%	-11.88%	10.65%	7.41%
2002	915	727	-188	36	-8.3%	-22.10%	16.33%	6.83%
2003	1,019	875	-144	53	16.7%	28.70%	5.27%	6.11%
2004	1,138	982	-156	45	9.7%	10.87%	8.72%	5.81%
2005	1,196	1,051	-145	46	8.1%	4.91%	5.87%	5.85%
2006	1,252	1,194	-58	43	10.1%	15.80%	3.24%	5.77%

Shown is the average across all firms with defined benefit pension plans over the period 1998 to 2006. The funded status is defined as the plan assets less the projected benefit obligation (PBO). Contributions are the amount that the company contributed to the pension plan and the return on plan assets is the actual % return that the pension plan assets earned. The market information is economy-wide and is not restricted to firms with defined benefit pension plans. The return on large company stocks and long-term corporate bonds was obtained from Ibbotson's Stocks, Bills, Bonds, and Inflation. The yield on high quality corporate bonds is the average of the yield on corporate bonds rated Aaa and Baa by Moody's as reported in the monthly Federal Reserve statistical release.

As discussed above, the funded status of most pension plans should reflect current economic conditions because the PBO should be measured using the yield on high quality corporate bonds, and pension assets are largely comprised of stocks and bonds. As expected, pension plans were overfunded in the late 1990s

when the stock market was doing well. More specifically the average pension plan was overfunded by $77 million and $214 million in 1998 and 1999, respectively; years when the average return on large company stocks was 28.58 percent and 21.04 percent, respectively. When the stock market declined in 2000, 2001, and 2002, there was a sizeable decrease in pension plan assets leading to many pension plans becoming underfunded. In addition, the yield on high quality corporate bonds has declined steadily since 1999, leading to higher PBOs and exacerbating the underfunding problem. The highest underfunding occurred in 2002, when the average pension plan was underfunded by $188 million. The largest improvement occurred in 2006, when the average funded status changed from $145 million underfunded to only $58 million underfunded.

The typical pension plan invests in a mix of stocks and bonds and the return on pension plan assets has followed trends in large company stock returns and the return on long-term corporate bonds. More specifically, the return on plan assets was negative in 2001 and 2002 (-4.64 percent and -8.3 percent, respectively) and improved to 16.7 percent when the stock market reported a 28.7 percent rebound in 2003. As you would expect, companies have increased on average their level of contributions to make-up for the deterioration in the funded status over time. More specifically, companies contributed between $13 and $17 million on average during the 1998 to 2001 time period when pension plans were overfunded. The average level of contributions tripled after that as plans became more underfunded. For example, the average company contributed $46 million in 2005 and $43 million in 2006.

Descriptive Statistics

Table 3: Descriptive Statistics and Variable Definitions

	Mean	Std. Dev.	10th Percentile	Median	90th Percentile
$CONTR_{it}$	0.005	0.007	0.000	0.002	0.014
$SIZE_{it}$	7.064	1.977	4.485	7.159	9.559
$FIRMAGE_{it}$	29.222	16.366	7.000	32.000	51.000
$UNION_{it}$	0.087	0.282	0.000	0.000	0.000
ΔEMP_{it}	-0.0001	0.002	-0.001	0.000	0.001
$COST_{it}$	0.003	0.007	-0.002	0.002	0.010
$DEBT_{it-1}$	0.640	0.212	0.372	0.639	0.894
CFO_{it}	0.084	0.058	0.017	0.079	0.160
$FUNDSTAT_{it-1}$	-0.006	0.035	-0.043	-0.003	0.025
$RETURN_{it}$	0.070	0.177	-0.085	0.086	0.185
MTR_{it}	0.193	0.154	0.000	0.272	0.350
$CAPX_{it}$	0.052	0.044	0.013	0.041	0.099

Shown are the descriptive statistics for the final sample of companies used in the regression analyses. The sample covers the period 1998 to 2006 and is comprised of 1,606 firms and 6,945 observations. Outliers are excluded by removing the top and bottom 1% of each continuous variable. All financial variables are deflated by total assets.

Variables are defined as follows:

$CONTR_{it}$ = *company contributions to the defined benefit pension plan;*
$SIZE_{it}$ = *the log of the market value of equity;*
$FIRMAGE_{it}$ = *the age of the firm in years;*
$UNION_{it}$ = *indicator variable equal to 1 if greater than fifty percent of the employees belong to a union, and 0 otherwise; hand-collected;*
ΔEMP_{it} = *change in the number of employees;*
$COST_{it}$ = *average pension expense over the past two years;*
$DEBT_{it-1}$ = *beginning of the year ratio of total liabilities to total assets;*
CFO_{it} = *average cash from operations over the past two years excluding pension contributions;*
$FUNDSTAT_{it-1}$ = *beginning of the year unrecorded pension asset or liability (defined as the funded status less the amount recorded on the balance sheet);*
$RETURN_{it}$ = *actual percentage return on pension plan assets;*
MTR_{it} = *the marginal tax rate if the plan is underfunded and 0 if the plan is overfunded;*
$CAPX_{it}$ = *average capital expenditures over the past two years.*

Table 3 reports descriptive information about the regression variables in model (1) for the entire sample of companies with pension plans. The average company has a mean market value of equity of $1,169

million (size is defined as the natural log of the market value of equity and the natural log of 1,169 equals 7.064). The average firm has also been in business a long time—29 years. This is expected as it is the companies in older, established industries that tend to have defined benefit pension plans. Over the sample period, the average company generated positive cash from operations (mean CFO_{it} of 0.084) and invested in the future through purchasing more property, plant and equipment each year (mean $CAPX_{it}$ of 0.052). Consistent with the information presented in Tables 1 and 2, on average, the sample companies' pension plans were underfunded (mean $FUNDSTAT_{it-1}$ of -0.006).

Determinants of Pension Plan Contributions

The results from estimating model (1) are reported in Table 4. With two exceptions ($SIZE_{it}$ and ΔEMP_{it}), the results are consistent with the expectations developed in the literature review section. The $SIZE_{it}$ variable is insignificantly different from zero. This may be due to lack of variation in this variable as the sample is comprised of large, mature firms with defined benefit pension plans. As expected, the age of the firm ($FIRMAGE_{it}$) is positively related to pension plan contributions (p>0.01). Older companies often have to make additional contributions to cover payments to retirees. This might also explain the insignificance of $SIZE_{it}$ as older companies also tend to be larger.

Table 4: Determinants of Pension Plan Contributions

	Coefficient	t-statistic
Intercept	-0.0002	-0.36
$SIZE_{it}$	-0.00004	-0.93
$FIRMAGE_{it}$	0.00004***	8.11
$UNION_{it}$	0.001***	3.67
ΔEMP_{it}	-0.135***	-3.16
$COST_{it}$	0.386***	30.89
$DEBT_{it-1}$	0.002***	5.54
CFO_{it}	0.009***	6.24
$FUNDSTAT_{it-1}$	-0.037***	-15.24
$RETURN_{it}$	-0.001***	-2.55
MTR_{it}	0.003***	6.21
$CAPX_{it}$	-0.007***	-3.52
Number of observations	6,945	
Adjusted R^2	0.315	

Shown are the results from a regression of company contributions to the defined benefit pension plan ($CONTR_{it}$) on the log of the market value of equity ($SIZE_{it}$), the age of the firm in years ($FIRMAGE_{it}$), an indicator variable equal to 1 if greater than fifty percent of the employees belong to a union ($UNION_{it}$), the change in the number of employees deflated by total assets (ΔEMP_{it}), the average pension or postretirement expense over the past two years deflated by total assets ($COST_{it}$), the beginning of the year ratio of total liabilities to total assets ($DEBT_{it-1}$), the average cash from operations over the past two years excluding pension contributions deflated by total assets (CFO_{it}), the beginning of the year unrecorded pension asset or liability deflated by total assets ($FUNDSTAT_{it-1}$), the actual percentage return on pension plan assets ($RETURN_{it}$), the marginal tax rate if the plan is underfunded and 0 if the plan is overfunded (MTR_{it}), and average capital expenditures over the past two years deflated by total assets ($CAPX_{it}$). The sample covers the period 1998 to 2006 and is comprised of 1,606 firms and 6,945 observations. Outliers are excluded by removing the top and bottom 1% of each continuous variable.

****Significantly different from zero at the 0.01 level based on a t-test.*

There is a positive relation between $CONTR_{it}$ and both $UNION_{it}$ and $COST_{it}$ (p>0.01), indicating that companies contribute more to their pension plan when the plan is more costly. In addition, companies with organized labor have less flexibility when it comes to reducing or freezing benefits, which leaves them in a position where they have to make contributions to the plan to maintain funding levels. Contrary to expectations, there is a negative relation between $CONTR_{it}$ and ΔEMP_{it}. On average, companies that reduce their workforce make greater contributions to their pension plan. This may be related to increasing funding to cover workers laid-off as part of restructuring plans.

Companies with higher debt contribute more to their pension plan, as can be seen by the positive relation between $CONTR_{it}$ and $DEBT_{it-1}$ ($p>0.01$). This is consistent with managers of high debt companies funding their pension plan to avoid bond rating downgrades and debt covenant problems. In addition, there is a positive relation between $CONTR_{it}$ and CFO_{it} ($p>0.01$). Companies have a higher level of contributions to their pension plans when they have the ability to fund the plan due to a higher level of cash from operations. This is after controlling for alternative investment opportunities (captured by $CAPX_{it}$) and is consistent with the idea that pension funds are a good place to store internal funds (see Francis and Reiter 1987).

Companies with extremely underfunded plans contribute more to their pension plan, as can be seen by the negative relation between $FUNDSTAT_{it-1}$ and $CONTR_{it}$ ($p<0.01$). This is expected because companies need to meet minimum funding requirements. The pressure to fund the pension plan through cash contributions is lessened when the pension plan assets earn a high rate of return and the plan effectively becomes self-funding. This is captured by the negative relation between the return on plan assets ($RETURN_{it}$) and $CONTR_{it}$ ($p<0.01$).

There is a positive relation between MTR_{it} and $CONTR_{it}$ ($p<0.01$). Companies with higher tax rates make larger contributions to the pension plan as they benefit more from taking a deduction for the contribution. Finally, consistent with Rauh (2006), I find a negative relation between $CAPX_{it}$ and $CONTR_{it}$ ($p<0.01$). Companies with other investment opportunities contribute less to the plan.

CONCLUSION

In recent years, many corporations have struggled with how to provide retirement benefits to their employees and how to fund pension plans that are growing increasingly more expensive. This paper examines two related research questions about the funding of pension plans. First, how has the average funded status of the pension plans of U.S. publicly traded companies varied over time in response to changing market conditions? Second, what are the determinants of companies' pension plan funding strategies?

I first evaluate the average pension plan funding for all U.S. publicly traded companies with pension plans during the period 1998 to 2006. As expected, I find that pension plans were overfunded on average in the late 1990s when the stock market was doing well, and became underfunded on average when the stock market declined in 2000, 2001, and 2002. To make up for this decline, companies have tripled their level of contributions over the 1998 to 2006 time period. I next investigate the determinants of pension plan contributions. I find that older companies, companies whose employees are protected by unions, companies with more costly plans, companies who are generating higher levels of cash from operations, and companies with more underfunding contribute more to their pension plans. In contrast, companies with other investment opportunities contribute less to their pension plans. Finally, companies contribute more when they have tax incentives and debt contracting incentives to do so.

This paper has implications for regulators and standard setters considering how to deal with pension funding shortfalls, accounting professionals dealing with accounting for and auditing companies with pension plans, CFOs determining their company's pension funding strategy, and investors and creditors evaluating the risks that companies with pension plans are taking on. I document that the funded status of pension plans is very sensitive to changing market conditions, making it difficult for companies to manage the funding levels of their plans even when they are diligent about making contributions. In addition, although companies are legally required to maintain a certain level of funding, the legal funding rules provide flexibility, such as allowing several years to make up a funding shortfall. This allows companies choices about when to fund their plans and this study documents that their cash contributions are correlated with firm specific incentives such as tax benefits and alternative opportunities for use of

funds. Investors and creditors should evaluate whether a company's pension funding levels give rise to additional risk (such as not being able to make legally required contributions). In addition, auditors should consider whether a company's funding strategy leads to higher audit risk in situations where the contributions are lower than expected.

This paper has a couple of limitations. First, the sample period of 1998 to 2006 was chosen because it is a recent time period with a range of stock market returns that reflect average economic conditions experienced by companies. The sample was purposely not extended to the financial crisis that occurred in 2008 and the subsequent recovery because this period may not be generalizeable to other years. An interesting extension of the study would be to examine whether the results differ around the time of the financial crisis. Second, this study uses publicly available data from companies' financial statements. Form 5500 (filed with the Internal Revenue Service) contains additional information that may be helpful in understanding companies funding strategies, such as the ratio of active to retired employees. An interesting area for future research would be to hand-collect data from the form 5500 for a small sample of companies in order to more fully investigate tax and other funding incentives.

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BIOGRAPHY

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