Corporate Pensions and Financial Distress

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Abstract

This paper analyzes the role of corporate pensions in firms' financial distress. We find firms with defined benefit (DB) pension plans reduce these plans' exposures to company stock prior to defaults, avoiding losses from declining stock prices. These firms also lower their contributions to DB plans significantly prior to defaults, increasing underfunding. Reduced company stock exposures and greater underfunding are strongly related to default probabilities. In contrast, neither the company stock exposures nor underfunding of DB plans is a significant determinant of the restructuring type (bankruptcies versus out of court restructurings). In contrast, exposures to company stock in defined contribution (DC) plans exhibit little variation over time prior to firms' defaults. We calculate that employees incur an average loss of $18 million per firm over the three years before default from their exposures to company stock. Further, company stock exposures in DC plans significantly increase a firm's probability of defaulting and filing for bankruptcy (instead of restructuring out of court), suggesting a link between employee-ownership-related managerial entrenchment and increased default risk.

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1. Introduction

When firms become financially distressed, their deteriorating financial conditions impose significant costs on employees. In addition to reduced job security, employees are also exposed to potential financial losses through their pensions.[1] The existence of such losses has been repeatedly noticed by industry sources, with extensive discussions on the key factors driving these losses for defined benefit (DB) and/or defined contribution (DC) pension plans. Despite such attention, no study has systematically documented the role of corporate pensions in firms' financial distress. This paper seeks to fill this gap.[2]

For firms with DB plans, anecdotal evidence emphasizes the importance of pension underfunding in bankruptcy cases. For example, the corporate turnaround expert Robert "Steve" Miller attributed the difficulties experienced by many firms in Chapter 11 in the distress resolution process to pension underfunding (TIME, October 17, 2005). Underfunding of DB plans can stem from reduced employer contributions and/or unwise investment decisions of the plans. In the latter case, given the ERISA requirements of prudence and diversification for corporate pension funds, the bad investment outcome may be driven by plans' holdings of company stock, which typically suffers large losses when the firm approaches default.[3] Moreover, the employee ownership of company stock through pension plans may influence firms' default probabilities and financial conditions, which we will discuss in detail below, and these influences may further affect pension underfunding.

[1] For example, participants in defined benefit (DB) plans often lose a large fraction of benefits if the firm terminates its plans because the PBGC coverage is often much lower than the benefits they were entitled to in the plans (e.g., UAL and Delphi Corp). Participants in defined contribution (DC) plans can incur large losses from retirement assets invested in company stock when the firm becomes financially distressed (e.g., Enron and WorldCom).

[2] Prior literature on financial distress focuses on effects on management (See Hotchkiss, John, Mooradian, and Thorburn (2008) for a review) and no study has analyzed the effects on employees.

[3] Of course, DB plans have to invest non-trivial amounts in company stock for the above effect to take place. Because of the ERISA restriction disallowing DB plans to invest more than 10% of assets in company stock, this may or may not be the case in practice, which we investigate in our analyses.

DB plans have experienced large declines in number in the last two decades. In contrast, defined contribution plans have experienced steady growth and become pivotal in the U.S. retirement system. One of the most striking features of these plans is the high percentage of assets frequently invested in the sponsor company's stock.[4] This lack of diversification can impose substantial costs on plan participants, particularly in firms' financial distress. For instance, the highly publicized lawsuits against Enron by its 401(K) participants were driven by the plan's loss from Enron's stock, which accounted for more than 60% of plan assets in 2000 (*Wall Street Journal*, November 23, 2001). Not only are these plans' excessive allocations to company stock in sharp contrast with the benefits associated with well-diversified portfolios (e.g., Sharpe, 1964), they also prompted the Pension Protection Act of 2006 to include a model notice plan sponsors need to distribute to participants when investment in employer-sponsored securities exceeds 20% of plan assets.

Regardless of whether the company stock is held by employees via DB or DC plans, it constitutes a form of employee ownership of the firm.[5] In spite of the financial risk such ownership imposes on employees when the firm becomes financially distressed, it has been strongly encouraged by corporate executives, citing efficiency enhancements. Specifically, such ownership aligns the interests of the employees with those of shareholders, motivating the employees to increase productivity, work morale, and ultimately, firm value. This motivational view is consistent with Alchian and Demsetz (1972) and Holmstrom (1979), implying improved performance and reduced likelihood and severity of financial distress for firms with higher exposures to company stock in pensions. Further, in the state of financial distress, this view

[4] E.g., in 2010, this percentage is 51.3% for Coca-Cola Co., 44.3% for Caterpillar Inc., 42% for General Electric Co. and Target Corp (July 12th, 2010, *Pension & Investment*).

[5] Obviously, company stock in pensions is not the only form of employee ownership. However, in firms with DC plans, it is arguably the most import form for non-executive employees because of its magnitude (shown in our analyses).

posits that employees with higher pension exposures to company stocks have stronger incentives to reduce the value loss through increased support for the distressed firm (such as higher human capital investment and temporary pay cuts). Thus, these firms are expected to manage through the process of resolving financial distress more efficiently.

Alternatively, management may encourage employee ownership in pension plans to entrench themselves. There is some evidence that employees prefer company stock to other investments in pension plans, possibly driven by behavioral traits.[6] Jensen and Meckling (1976) list strong relations between management and employees as a non-pecuniary benefit enjoyed by managers, which have led to management-employee allies in many proxy contests (e.g., Stulz, 1988; Pagano and Volpin, 2005). Besides management-employee bonding, since employees are interested in job retention, they are more likely to side with the incumbent management in proxy contests. Thus, employee ownership in pensions can serve as an effective takeover defense (Rauh, 2006). Under this entrenchment view, firms with higher exposures to company stock in pension plans are expected to have more agency problems and enjoy less operational efficiency, implying a higher likelihood and severity of financial distress. Moreover, once distressed, these firms are expected to encounter more agency issues in the restructuring process, leading to lower efficiency in distress resolution.

Because the motivational and entrenchment views have opposite predictions, the influences of pensions' company stock ownership on the likelihood and resolution process of financial distress become an empirical question. We explore this issue in our analyses for both firms with DB plans and those with DC plans.

[6] For example, the executive VP and DC practice leader of Callan Associates Inc., Lori Lucas, noted that "when a company's stock goes up, employees don't want to diversify, and when it goes down, employees think the stock is a bargain. When one company's stock 'blows up,' taking participants' retirement assets with it, …, employees in other companies don't think the same thing could happen to them…" (July 12th, 2010, *Pension & Investment*). Benartzi (2001) shows that employees excessively extrapolate past performance of company stock in DC plan investment.

To conduct our analyses, we identify 597 defaults from 1992 to 2009 in Moody's *Default Risk Service* database, with 216 defaults involving firms with DB plans and 501 defaults involving firms with DC plans. For firms with DB plans, we document a sharp decrease in these plans' exposures to company stock prior to defaults, which is likely to be driven by the firms' desires to avoid plan losses from declining stock prices. These firms also significantly lower their contributions to DB plans when approaching default, while the level and percentage of underfunding for these plans experience large increases.

When we analyze the effects of underfunding and exposures to company stock in DB plans on a firm's default probability using a default prediction model similar to Shumway (2001), we find increasing underfunding positively predicts defaults, whereas company stock exposures reduce default probabilities. Further, firms with higher company stock exposures three years ago and underfunded pensions in the current year have higher default probabilities than other firms, suggesting a combined effect of these two factors on default risk, although the evidence is relatively weak. Firms may want to file for bankruptcy rather than restructure out of court if they benefit by shifting pension obligations to PBGC. In contrast with pension underfunding and company stock exposures' strong influences on default probabilities, we find no evidence that either one of them is a strong determinant for the restructuring types (bankruptcies versus out of court restructurings) of defaulting firms. Thus, our findings cast doubts on the argument that defaulting firms often opt for bankruptcies to terminate underfunded pensions, a practice not allowed in out of court restructurings.

Because underfunding is not relevant for DC plans, we focus on these plans' exposures to company stock in all analyses involving firms with DC plans. We find these exposures exhibit little variations in the years prior to firms' defaults, while stock prices decline sharply in the

meantime. As a result, firms' employees suffer from an average loss of $18 million per firm during the three years before default because of the failure to reduce company stock exposures in pensions. In addition, contributions to DC plans by both employees and sponsor firms are very stables in the years prior to defaults, indicating that neither party proactively reduces the employees' exposures to an investment strategy under-diversified in an asset with expected losses (i.e., company stock). These findings are consistent with DC plan participants' asset allocation inertia documented by Agnew, Balduzzi, and Sunden (2003).

Using a default prediction model similar to Shumway (2001), we find company stock exposures in DC plans strongly predict firms' defaults. Further, company stock exposures are also positively related to bankruptcy filings (instead of out of court restructurings), indicating an increased severity of financial distress among defaulting firms with higher company stock exposures. These findings are consistent with the entrenchment view of employee ownership, suggesting an association between employee-ownership-related managerial entrenchment and increased default risk.

Our paper is the first in the literature to document the exposures of firms' employees to losses in the event of distress via their pension holdings as well as documenting the outcomes for pension plan participants in a large sample of firms that fail. Our findings also complement and extend the analyses of Rauh (2009) on the relationship between DB plan underfunding and firms' bankruptcy probabilities.[7] Because his bankruptcy sample is small (with only 16 bankruptcies), Rauh (2009) does not find conclusive evidence on this relationship, which we identify using a significantly larger sample of defaults. Further, our paper sheds lights on whether and how company stock exposures in DB plans affect their underfunding and the combined influences of

[7] Our paper is also related to Benmelech et al. (2011), who document an increased likelihood for bankrupted airlines to obtain wage concessions from employees when their DB plans are underfunded.

these two factors on default probabilities. Finally, we provide direct evidence to policy makers on the benefits and costs of regulating DB plan underfunding and company stock ownership in DC plans (such as imposing an upper limit).

The rest of the paper is organized as follows. Section 2 discusses the data used in our analyses and presents summary statistics for the key default and pension variables. Section 3 examines the effects of corporate pensions on firms' default probabilities. Section 4 analyzes the role of corporate pensions in defaulting firms' choices of restructuring types. Section 5 concludes.

2. Data

2.1. Sample description

We identify defaults using Moody's *Default Risk Service (DRS)* database. Moody's *DRS* defines a default to be: (a) a missed interest or principal payment on a debt obligation, (b) a filing of a court-led bankruptcy, or (c) the execution of an out-of-court "distressed exchange."[8] Since our objective is to analyze the relationship between U.S. corporate pensions and financial distress, we exclude defaulting firms incorporated outside the U.S. Financial characteristics of the defaulting firms are obtained as available from Compustat, and we omit defaults without financial information, most of which involve private firms. Our final default sample consists of 597 defaults from 1992 to 2009.

The data on corporate pension plans comes from the IRS 5500 research files from the Department of Labor (DOL). The IRS 5500 Schedules H and B contain pension asset and liability values as of the beginning and end of the plan year, and must be filed annually by

[8] A distressed exchange involves exchanging debt for another security of lower priority such as equity, open market purchases of debt by the borrower at a substantial discount to the face value of the debt, or any other exchange that appears to allow the borrower to avoid default. See Moody's Corporate Risk Default Service (2007).

pension plan sponsors for plans with greater than 100 participants.[9] We match the IRS 5500 data to Compustat using the IRS Employer Identification Number (EIN) and company names. Our full IRS-Compustat matched sample consists of 78,731 firm-year observations representing 8,632 firms from 1992-2009. Stock prices and returns are from CRSP. Among the 597 defaults in our default sample, we are able to locate pension information for 516 of them in the IRS 5500 database.

2.2. Descriptive statistics

In this section, we provide descriptive statistics for the key financial and pension variables for firms in our default sample.

(Table 1 about Here)

Panel A of Table 1 presents summary statistics over time for the financial characteristics of the 597 defaults in our default sample. The first four columns provide the total number of defaults, assets, sales, and number of employees at the last reporting date prior to default, for defaults with available pension information in the IRS 5500 database. Summary statistics for the same variables are reported in the second four columns for defaults without pension information. Firms with pension information are considerably larger than those without pension information. The average assets for the former group (column 2) are $5,491 million and it is only slightly more than one third of that at $1990.4 million for the latter group. Statistics for sales and the number of employees follow similar patterns.

In Panel B of Table 1, we classify the 516 defaults with pension information into those with defined benefit (DB) or defined contribution (DC) plans, and provide summary statistics

[9] Prior to 2008, actuarial valuations of pension plan assets and liabilities were reported in IRS 5500 Schedule B, while this schedule was split into Schedules SB for single-employer plans and MB for multiple-employer plans from 2008 onward. Multiple-employer plans are negotiated by unions for employees of multiple firms and are excluded from our sample for the difficulty of attributing assets and liabilities to individual firms.

over time for each group's financial characteristics. Note that we have 201 defaults for which the firms have both types of plans, and they are included in both DB and DC groups. In total, 501 defaults involve firms with DC plans and the number for DB plans is significantly smaller at 216, which is consistent with the trend starting from 1980s for firms to favor DC to DB plans. Firms with DC plans are smaller than those with DB plans, with average assets of $5,604.4 and $10,409.6 million for the two groups, respectively. In this panel, in addition to the variables reported in Panel A, we also report the number of employees covered by the pension plans in the IRS 5500 database. DB plans cover about one third of firms' employees and DC plans cover about half.[10]

2.2.1. Defaulting firms with defined benefit (DB) pension plans

We now turn to the descriptive statistics of the key pension variables for firms in our default sample. Panels A and B of Table 2 present these statistics for defaults involving firms with DB and DC plans, respectively.

(Table 2 about Here)

The first column in Panel A lists the number of observations with non-missing pension information in each of the five years prior to the 216 defaults involving firms with DB plans in our sample. The next 8 columns provide summary statistics for these plans' underfunding conditions. Similar to Benmelech et al. (2011), we calculate the level of plan underfunding by subtracting the total assets of the plan from the current liability of the total benefits due to all plan participants. While other measures of underfunding exist, the above is the common definition used by the PBGC. We then aggregate the underfunding level across plans for each

[10] A firm can have more than one DB and/or DC plans. If a firm has multiple DB plans, each employee usually participates in only one plan. On the other hand, if the firm has multiple DC plans, employees often participate in more than one plan. Thus, the number of employees covered by DC plans is calculated as the largest number of plan participants among plans. Note this is a conservative estimate that may understate the number of employees covered by DC plans because some employees might choose to only participate in smaller plans.

firm at each plan date to obtain the firm's underfunding level. Following Benmelech et al. (2011), we also calculate the percentage of underfunding by dividing the total assets across plans by the firm's underfunding level.

In column 3, the median percentage of underfunding for defaulting firms with DB plans increases over time, indicating the difficulty these firms experience in funding their pensions when approaching financial distress.[11] In year -5, the median underfunding percentage is -2.9% (i.e., the plans are overfunded by 2.9%), whereas it is 9.3% in year -1. Column 4 presents the fraction of firms with underfunded pensions at each of year -5 to -1 prior to defaults, and we observe an increasing fraction of underfunded firms over time. By the year before default, pension plans become underfunded for about two thirds of the defaulting firms. We are also interested in the fraction of firms with deep pension underfunding: i.e., those with underfunding accounting for more than 10% of plan assets (column 5), and find a similar increasing pattern to that in column 4. Firms must increase contribution to pensions if a plan is funded below 90% of current liabilities for three consecutive years or below 80% in any year. Thus, the growing fraction of firms with deep underfunding further illustrates the pressures firms face from the funding requirements of their pensions when approaching defaults.[12]

In the next four columns of Panel A, we restrict the sample to firms with underfunded pensions and present the mean and median amounts and percentage of underfunding for them in the five years prior to defaults. We note an increasing pattern in underfunding in these columns. For example, in year -5 and -4, the mean underfunding is $75.8 and $73.8 million, respectively, while they increase to $110.9 and $108.0 million in year -2 and -1. These underfunding levels

[11] Note that the large values of mean percentage of underfunding in year -5 in columns 2 and 8 are driven by an outliner. If we remove this outliner, these values become similar to those in year -4.

[12] Similar to Benmelech et al. (2011), we calculate the percentage of underfunding using total plan assets instead of total current liabilities to capture the asset shortages of DB plans. In untabulated analyses, we measure the percentage of underfunding by diving underfunding on the plans' total current liabilities, and find no qualitative changes in any results in this paper.

represent the additional amounts firms need to contribute to the pension plans in order to fulfill their obligations to active and retired employees, and hence the magnitude of obligations firms can reduce in cases of distress terminations of pension plans.[13]

Columns 10-14 of Panel A present summary statistics for the defaulting firms' exposures to company stock in their DB plans. Only a small fraction of these firms (ranging from 1.5% to 6.9% in the five years prior to defaults) have such exposures and this fraction decreases over time, as illustrated by column 10. In the next four columns, we restrict the sample to firms with company stock exposures in pensions and examine their levels of exposures, which we find to be very low as well. When we measure the level of exposures as the fraction of the total number of shares outstanding of firms owned by DB plans, the median exposure never exceeds 0.5% in year -5 to -1 and goes down to 0.2% in year -1. A similar pattern can be found when we measure the pensions' exposures to company stock as the ratio of company stock value in plans over total plan assets. Combined with a decreasing fraction of firms having such exposures (column 10), statistics in these four columns suggest that firms reduce their pensions' exposures to company stock when approaching financial distress, which allows them to avoid the potential losses from declining stock prices.[14]

Finally, column 15 of Panel A presents the mean values of firms' contributions to DB plans in the five years prior to defaults. The contribution level is stable at about $12-$13 million in the first four years and drops to $4.5 million in the last year before defaults. In sum, firms significantly reduce contributions to DB plans when financial distress is immediate, possibly

[13] Most DB plans are covered by PBGC guarantee. Thus, employees will not lose all of their pension benefits in distress terminations. However, PBGC imposes benefit limits based on the participants' ages, which can be significantly lower than what a participant would be entitled to if the plans were not terminated. For example, in 2009 (the last year of our sample period), the PBGC limits for 55-, 60-, and 65-years-old participants are $24,300, $35,100, and $54,000, respectively.

[14] DB plans have a 10% limit on the maximum fraction of assets allowed to be invested in company stock. Our findings show that in practice, firms' DB plans have much lower exposures to company stock than this limit.

caused by cash flow constraints.

2.2.2. Defaulting firms with defined contribution (DC) pension plans

In this section, we focus on the company stock exposures of DC plans among defaulting firms and present summary statistics of their key pension characteristics in Panel B of Table 2. Unlike DB plans, sponsors of DC plans are not committed to fixed levels of benefits for their employees upon retirements and often can choose whether and how much to match the contributions of employees. Hence, the underfunding problem is of little relevance for DC plans. On the other hand, there is no mandatory limit on how much of DC plans' asset can be invested in company stock, and employee ownership through DC plans is often encouraged by firm management (as discussed in Section 1).

The first column in Panel B provides the number of firms with non-missing pension information in each of the five years prior to the 501 defaults involving firms with DC plans in our sample. In column 2, we present the fraction of firms with company stock exposures and find it to be stable at about 24% in the five years prior to defaults. In the next four columns, we restrict the sample to firms with company stock exposures in pensions and examine their levels of exposures. Columns 3 and 4 measure exposure level by dividing the number of shares owned by DC plans by the total number of shares outstanding of the firm, while columns 5 and 6 measure it by dividing the value of company stock in DC plans by total plan assets. When using the first measure, the mean exposure level among defaulting firms is stable at about 2% throughout year -5 to -1. In contrast, we find the mean exposure level drops significantly over time when using the second measure: it is 22.4% in year -5 but only 11.9% in year -1. These findings indicate that while the number of shares owned by DC plans does not vary significantly over time, their value decreases sharply as the firms approach financial distress. In untabulated

analyses, we find that the average value of company stock in DC plans is $20.4 million in year -3 for defaulting firms with company stock exposures (in year -3), and if they continue to hold these stocks till the default dates (as suggested by columns 2-6), their value decreases by $18 million to $2.4 million. To summarize, DC plan sponsors and participants do not actively adjust these plans' exposures to company stock prior to defaults, and such inertia imposes significant losses on plan participants because of the value loss of company stock.

Columns 7 and 8 of Panel B report the average contributions to DC plans of defaulting firms made by the sponsor firms and employees, respectively. On average, firms contribute $4.3 million each year and employees contribute $12.8 million, with both groups' contributions appear to be stable over time. These findings are consistent with the contractual nature of employer-matching of employee contributions in DC plans and the investment inertia of DC plan participants discussed in Agnew, Balduzzi, and Sunden (2003) and Madrian and Shea (2001). In other words, despite the deteriorating stock performance of firms approaching financial distress, DC plan participants continue to contribute a fixed fraction of income to the plans with large exposures to company stock (i.e., an investment strategy with expected losses).

3. Default Probabilities

3.1. Firms with defined benefit (DB) pension plans

In examining the determinants of default probabilities among firms with DB plans, we focus on two factors: the first is the pensions' exposures to company stock, and the second is pension underfunding. If employee ownership through pension plans has a motivational effect on employees, we expect such exposure to reduce the likelihood of financial distress. In contrast, if the exposures are motivated by the management's desires to secure employee support (which can

be used as an entrenchment mechanism), such entrenchment may be associated with higher default probabilities. Pension underfunding is expected to increase the firms' default probabilities because it represents a cash flow obligation in the near future, which imposes direct pressures on financially constrained firms. We are also interested in the interaction between company stock exposures and pension underfunding and their combined effects on default probabilities because the declining stock performance of financially constrained firms may exacerbate the underfunding problem through pension exposures to company stock, which may further increases default probabilities.

To test the impacts of the above two factors on default probabilities, we estimate a discrete time hazard model using the methodology of Shumway (2001). This approach is similar to a panel logit model, and permits our covariates explaining defaults to be time varying. The dependent variable equals to one if the firm defaults in a given year and zero otherwise. We construct a dummy variable D_{uf} to indicate firms with underfunded DB plans in a given year. We also interact this dummy variable with the level of underfunding (denoted by *underfunding*) and the percentage of underfunding (denoted by PCT_{uf}) in a given year, whose constructions are described in Section 2.2.1. These interaction terms allow us to explore the effects of the level and percentage of pension underfunding on default probabilities.

In default prediction models it is obviously important to control for firm financial performance. Thus, we include annual sale growth and change in EBITDA/Sales as controls. We also control for differences in leverage, measured by total liabilities divided by total assets, as well as past stock performance, measured by cumulative stock returns in the past twelve months. To include as many observations as possible, when any of the control variables is missing, we replace them with industry median values of the same year, where industry is measured by 2-

digit SIC codes, or returns on S&P 500 index if past stock returns are missing. Year dummies are also included to control for changing macroeconomic conditions over time.

(Table 3 about Here)

The hazard model estimates are shown in Table 3. The first specification indicates that firms with underfunded DB plans have significantly higher default probabilities compared to firms with fully- or over-funded pensions. This finding is consistent with the prediction that the liabilities of funding DB plans increase firms' likelihood to default. Among control variables, decreasing EBITDA/sales changes, increasing leverage, and declining stock performance are significant predictors of defaults, as would be expected. In contrast, we find no evidence that sales growth affects the likelihood of defaults, even if we do not include some other control variables such as leverage (un-tabulated).

In the specification in column 2, in addition to the underfunding dummy, we also include its interaction with the level of underfunding (D_{uf}×*underfunding*) in independent variables. However, the coefficient on this interaction term is not significant, suggesting that the actual level of underfunding has little impact on default probabilities. The regression in column 3 includes the interaction term between the underfunding dummy and the percentage of underfunding (D_{uf}×*PCTuf*) in independent variables. The coefficient on this interaction term is not significant either, suggesting that the percentage of underfunding has little impact on default probabilities as well.

The specification in column 4 examines the effects of company stock exposures in DB plans on firms' default probabilities. Specifically, we add the level of this exposure, measured by the fraction of the firm's shares outstanding owned by its DB plans in year -3 ($EMPO_{-3}$), to the independent variables of the above hazard model. We choose to use the company stock exposure

levels in year -3 instead of on the last reporting dates before defaults because results in Panel A of Table 2 show that most defaulting firms with past DB plan exposures to company stock eliminate such exposures shortly before defaults. Since only a small fraction of firms with DB plans have pension exposures to company stock, we also include a dummy indicating positive exposures in year -3 (D^{emp}_{-3}) in the independent variables to account for the possibility that some unobservable firm characteristics drive the existence and levels of such exposures. We find a negative and significant coefficient on $EMPO_{-3}$, suggesting that higher company stock exposures in DB plans are associated with lower default probabilities in the future.

Finally, the specification in column 4 also includes an interaction term between the underfunding dummy (D_{uf}) and the level of company stock exposures in DB plans in year -3 ($EMPO_{-3}$) in independent variables, and we find a positive and weakly significant coefficient on it. This interaction term represents the combined and codetermined effects of company stock exposures and pension underfunding, and our finding suggests that pension exposures to company stock might exacerbate the underfunding problem leading to defaults, although the effects are fairly weak. Combined with our previous findings that higher company stock exposures are in general associated with lower default probabilities (as suggested by the coefficient on $EMPO_{-3}$), and the low exposure levels among firms with DB plans in Panel A of Table 2, we conclude that company stock exposures in DB plans are not a key factor leading to pension underfunding, which significantly increases default probabilities.

To summarize, we find a higher incidence of defaults among firms with underfunded DB plans, although the actual level and percentage of underfunding do not significantly affect default probabilities. Further, firms with higher company stock exposures in DB plans have lower likelihood to default. Although company stock exposures in DB plans may exacerbate the

pension underfunding problem due to declining stock prices (and hence lead to defaults), firms have little such exposures and proactively sell the company stock when approaching defaults. Therefore, the strong association between pension underfunding and firms' default probabilities is unlikely to be driven by DB plans' exposures to company stock.

3.2. Firms with defined contribution (DC) pension plans

In exploring the determinants of default probabilities among firms with DC plans, we focus on the plans' exposures to company stock, measured by the fraction of the firm's shares outstanding owned by its DC plans (*EMPO*). Specifically, we examine whether *EMPO* is a significant predictor for defaults in the hazard model described in Section 3.1, controlling for the financial and stock performance variables in Table 3. Results of this regression are reported in column 1 of Table 4.

(Table 4 about Here)

Results in column 1 indicate that increasing company stock exposures in DC plans are associated with higher default probabilities: the coefficient on *EMPO* is positive and significant at the 1% level. We also construct two additional measures of company stock exposures. The first is denoted by *EMPO1*, which take the value of *EMPO* if it is greater than 1% and zero otherwise. The second is denoted by *EMPO5*, which take the value of *EMPO* if it is greater than 5% and zero otherwise. These two variables, when included in our hazard model, allow us to test whether the positive relation between company stock exposures in DC plans and default probabilities in column 1 continues to hold when these exposures become large, in which case employee ownership through DC plans can play a significant role in corporate decisions (and hence the effects of the motivational and entrenchment view discussed in Section 1 are expected to be strong). The positive and significant coefficients on *EMPO1* and *EMPO5* in columns 2 and

3 show that this is indeed the case. Overall, our results in Table 4 suggest that increasing company stock exposures in DC plans lead to greater default probabilities, which is consistent with the entrenchment view of employee stock ownership through pension plans discussed in Section 1.

4. Restructurings of Defaults

In addition to the initial default date, Moody's *DRS* database also contains information about whether the firm resolved its distress out of court or through a bankruptcy filing, the bankruptcy filing date in cases that a court filing occurs, whether the bankruptcy filing was "prepackaged," and the resolution date of the restructuring. Using the above information, we classify defaults into four categories based on their restructuring type: distressed exchange, other out of court restructuring, prepackaged or prearranged Chapter 11 filing, or other Chapter 11 filing.[15] In addition, we pool the defaults involving distressed exchanges and other out of court restructurings and classify them as out of court restructurings, and pool defaults involving prepackaged or prearranged Chapter 11 and other Chapter 11 and classify them as bankruptcies.

4.1. Descriptive statistics

Panels A and B of Table 5 present summary statistics of the financial characteristics for the firms involved in the 460 bankruptcies in our default sample over time, among which we are able to locate pension information in the IRS 5500 database for 396 bankruptcies. The distribution of these bankruptcies is similar to that of the full default sample (Table 1), and we therefore omit discussing this panel for brevity. We omit reporting these statistics for firms restructuring out of court because of their similarity to those for the bankruptcy sample, but they

[15] Prepackaged bankruptcies differ from prearranged bankruptcies by already having the "Plan of Reorganization" approved by most of the creditors in the case. This means the judge can move quickly through documents and motions to confirm the bankruptcy restructuring in a short period of time.

are available to interested readers upon request.

(Table 5 about Here)

Panels C and D (E and F) provide summary statistics of the key pension variables (described in Section 2) for firms with DB (DC) plans that file for bankruptcies or restructure out of court. These summary statistics are again similar to those for the complete default sample (Table 2), and we omit discussing them as well.

(Table 6 about Here)

Table 6 shows the restructuring types for the 597 defaults in our default sample. We first note that the distribution of restructuring types is very similar for firms with and without pension information in the IRS 5500 database. On average, about 77% of default observations are Chapter 11 bankruptcies and about 27% are out of court restructurings. Among bankruptcies, we distinguish between pre-packaged Chapter 11 bankruptcies (13% of defaults) and other Chapter 11 filings (64% of defaults). Out of court restructurings that are unsuccessful and subsequently file for Chapter 11 are characterized as bankruptcies. Among the out of court restructurings, distressed exchanges are the most common (14%-15% of defaults), while other out of court workouts are relatively rare (9% of defaults).

Table 6 also presents the distribution of restructuring types among defaults of firms with DB or DC plans. Firms with DB plans appear to be more likely to file for bankruptcies (80.1% of DB-related defaulting firms and 76.2% of DC-related firms), and this finding becomes more striking when we further classify defaulting firms into those only having DB plans, only having DC plans, or having both. Among firms only having DB plans, 93.3% of defaults involve bankruptcies instead of out of court restructurings, whereas this ratio is lowered to 74.3% and 79.1% among firms only having DC plans and having both types of plans, respectively. Since

firms with DB plans can attempt to terminate these plans and eliminate pension funding obligations only in bankruptcy filings (but not in out of court restructurings), it is often argued that these firms, once financial distressed, tend to favor bankruptcies to out of court restructurings.[16] In unreported analyses, we identify the distress terminations of DB plans and find for 46 out of the 173 DB-related bankruptcies in our sample, PBGC subsequently replaced the sponsor firms as plan trustees. We explore whether pension underfunding indeed causes firms with DB plans to favor bankruptcies in restructurings or not in the next section.

4.2. Multivariate analysis

4.2.1. Defaulting firms with defined benefit (DB) pension plans

Although the summaries statistics of pension variables for bankrupted firms and those in out of court restructurings in Table 5 are informative about how underfunding and company stock exposures in DB plans affect firms' likelihood to file for bankruptcies, they do not control for other differences in firm characteristics, many of which were shown to be significant in Tables 3 and 4.

In Table 7, we test how pension underfunding affects the likelihood for defaulting firms with DB plans to file for bankruptcy versus restructure out of court, using logit regressions that control for various pre-default characteristics described in Section 3. In addition to the underfunding dummy constructed in Section 3 (D_{uf}), we also construct three dummies for deep underfunding. They are denoted by D^{10}_{uf}, D^{15}_{uf}, and D^{25}_{uf}, indicating pension underfunding exceeding 10%, 15%, and 25% of total pension assets, respectively. These dummies allow us to test whether the likelihood of bankruptcies among firms with deep DB underfunding is significantly different from that of other firms.

[16] Note that firms can terminate DB plans under normal operational conditions as well. In this case, the plans need to be fully funded and firms cannot eliminate funding obligations through such terminations.

(Table 7 about Here)

In the four regressions reported in Table 7, none of the coefficients on any of the underfunding dummies (D_{uf}, D^{10}_{uf}, D^{15}_{uf}, and D^{25}_{uf}) are significant, consistent with what we find in the summary statistics in Table 6 that a large fraction of firms have pension underfunding shortly before defaults, regardless of whether the defaults involve bankruptcies or out of court restructurings. These results suggest that pension underfunding is not a significant determinant for restructuring types of defaulting firms with DB plans, although the obligations associated with it increase firms' default probabilities (as shown in Table 3). In unreported analyses, we also examine whether the amount or the percentage of pension underfunding affect firms' choice between bankruptcies and out of court restructurings, and find no evidence that such effects exist. Overall, our results indicate that although bankruptcies (versus out of court restructurings) may be associated with certain benefits for defaulting firms with underfunded pensions (such as the possibility to eliminate pension funding obligations through distress terminations of DB plans), these benefits may be difficult to realize and hence not strong enough to outweigh the increased costs of bankruptcies compared to out of court restructurings.[17]

Exposures to company stock in DB plans have little relevance to defaulting firms' choices between bankruptcies and out of court restructurings. As shown in Panels C and D of Table 6, almost all firms with DB plans in our default sample have eliminated such exposures in the year prior to defaults. In sum, results in this section indicate that neither underfunding nor company stock exposures in DB plans constitutes a key determinant for firms' default restructuring types.

4.2.2. Defaulting firms with defined contribution (DC) pension plans

We now turn to exploring the determinants of restructuring types among defaulting firms

[17] Terminations of DB plans in bankruptcies can be difficult because the firm needs to prove it can't successfully reorganize if the pensions continue.

with DC plans, with the focus on the plans' exposures to company stock (measured by the fraction of shares outstanding owned by DC plans, denoted by *EMPO*). Specifically, we test whether company stock exposures in DC plans affect the likelihood for defaulting firms to file for bankruptcies instead of restructure out of court, using logit regressions that control for various pre-default characteristics described in Section 3. We also use the other two company stock exposure measures constructed in Section 3 for exposure levels greater than 1% and 5%, *EMPO1* and *EMPO5*, to examine whether large company stock exposures in DC plans affect defaulting firms' restructuring types. We are interested in this because when employee ownership through DC plans is large, the employees' equity stake can become critical in corporate decisions, in which case the effects of both the motivational and entrenchment views discussed in Section 1 are expected to become stronger. Results of the above regressions are reported in Table 8.

(Table 8 about Here)

Results in column 1 indicate that increasing company stock exposures in DC plans are associated with higher probabilities for bankruptcy filings instead of out of court restructurings: the coefficient on *EMPO* is positive and significant with a *z*-statistic of 2.11. The positive and significant coefficients on *EMPO1* and *EMPO5* in columns 2 and 3 show that the above positive effect exists as well when comparing defaulting firms with large company stock exposures in DC plans (greater than 1% or 5%) to other defaulting firms. Overall, our results in Table 8 suggest that increasing company stock exposures in DC plans lead to larger probabilities for defaulting firms to file for bankruptcies instead of restructure out of court, which is consistent with the entrenchment view of employee stock ownership through pension plans.

5. Conclusion

This paper analyzes the role of corporate pensions in firms' financial distress. We find firms with defined benefit (DB) pension plans reduce these plans' exposures to company stock prior to defaults, avoiding losses from declining stock prices. These firms also lower their contributions to DB plans significantly prior to defaults, increasing underfunding. Reduced company stock exposures and greater underfunding are strongly related to default probabilities. In contrast, neither the company stock exposures nor underfunding of DB plans is a significant determinant of the restructuring type (bankruptcies versus out of court restructurings). In contrast, exposures to company stock in defined contribution (DC) plans exhibit little variation over time prior to firms' defaults. We calculate that employees incur an average loss of $18 million per firm over the three years before default from their exposures to company stock. Further, company stock exposures in DC plans significantly increase a firm's probability of defaulting and filing for bankruptcy (instead of restructuring out of court), suggesting a link between employee-ownership-related managerial entrenchment and increased default risk.

Our paper is the first in the literature to document the exposures of firms' employees to losses in the event of distress via their pension holdings as well as documenting the outcomes for pension plan participants in a large sample of firms that fail. We fill the gap in the academic literature on the impacts of company stock ownership in pension plans on a firm's likelihood to default and its restructuring process. Our paper sheds lights on whether and how company stock exposures in DB plans affect their underfunding and the combined influences of two factors on default probabilities. Finally, we provide direct evidence to policy makers on the benefits and costs of regulating DB plan underfunding and company stock ownership in DC plans (such as imposing an upper limit).

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Table 1
Default frequencies and other characteristics

Panel A considers defaulting firms with and without pension information in the IRS 5500 database and reports the number of defaults, the defaulting firms' assets (in million), sales (in million), and the number of employees on the last reporting date prior to defaults for each year from 1992-2009. Panel B considers defaulting firms with DB and DC plans and reports the number of defaults, the defaulting firms' assets (in million), sales (in million), the number of employees, and the number of employees covered by the pension plans on the last reporting date prior to defaults for each year from 1992-2009.

Panel A: The full default sample

In IRS 5500					Not in IRS 5500			
Year	# of defaults	Assets	Sales	Employees	# of defaults	Assets	Sales	Employees
1992	19	1704.1	494.3	3544.8	4	428.0	540.6	3227.5
1993	18	1576.7	518.3	3178.7	3	707.6	505.8	1129.0
1994	6	313.7	457.3	3443.3	2	98.5	103.1	303.5
1995	14	782.2	671.1	4827.8	2	483.9	961.5	8007.5
1996	8	348.2	210.8	1491.5	3	263.6	163.1	4000.0
1997	12	1076.5	1116.0	5152.9	3	708.5	1203.0	33890.0
1998	25	577.7	805.1	5720.9	4	791.1	504.8	3820.0
1999	34	978.7	805.5	11899.5	11	690.8	192.6	2502.5
2000	48	1101.7	863.2	5740.3	9	1678.8	2904.2	9990.9
2001	79	2296.3	2282.2	5767.8	15	1314.3	784.2	5702.2
2002	59	5689.4	2972.5	10131.0	8	7367.6	1231.8	5117.5
2003	29	998.8	1316.0	4352.3	8	938.0	332.8	1954.4
2004	25	776.2	665.1	2807.5	1	87.8	194.3	1200.0
2005	19	7158.4	5268.0	24392.9	1	777.1	968.7	3025.0
2006	9	285.6	395.3	2111.2	2	962.8	393.2	4577.0
2007	9	392.2	667.5	7637.2	0			
2008	34	37989.5	4300.2	9554.7	1	173.4	11.6	15.0
2009	69	9336.9	6724.9	14740.3	4	9578.6	882.7	3942.5
total	516	5491.0	2452.0	8241.6	81	1990.4	863.6	5562.8

Panel B: Defaults of firms with DB and DC plans

Firms with DB plans						Firms with DC plans				
Year	# of defaults	Assets	Sales	Employees	Plan participants	# of defaults	Assets	Sales	Employees	Plan participants
1992	7	2592.3	692.9	6269.4	4472.9	19	1704.1	521.8	3544.8	1668.8
1993	11	2453.0	670.2	4127.4	1873.7	16	1738.6	550.0	2518.1	2423.1
1994	1	170.7	117.3	900.0	739.8	6	313.7	457.3	3443.3	1386.9
1995	4	1485.0	1420.3	10547.3	4486.1	13	829.5	683.2	5199.2	1752.0
1996	2	197.2	254.2	2325.0	1530.0	7	389.6	232.5	1611.7	932.8
1997	4	2609.5	1290.1	7668.0	3975.2	12	1076.5	1116.0	5152.9	2984.9
1998	6	1053.8	2044.9	14092.7	4629.1	25	577.7	805.1	5720.9	2144.7
1999	8	1385.2	1048.7	10359.6	1584.2	34	978.7	830.0	11899.5	6937.0
2000	22	1741.2	1156.7	6113.1	755.6	45	844.7	843.4	5944.8	1828.0
2001	32	4400.3	4779.4	8010.1	3472.5	77	2330.0	2328.0	5697.1	2689.6
2002	34	8742.2	4633.3	13885.3	7962.4	58	5732.6	3005.8	10305.7	7025.1
2003	13	1212.0	2100.8	7003.1	2645.9	27	1058.2	1397.8	4580.8	4116.3
2004	10	1343.4	1080.8	2945.6	449.1	25	776.2	665.1	2807.5	1256.0
2005	8	10621.7	8884.3	42138.5	11649.8	18	7413.8	5384.0	25031.9	12099.0
2006	1	300.2	350.8	905.0	0.0	9	285.6	395.3	2111.2	2061.9
2007	2	191.4	128.6	643.5	268.9	9	392.2	667.5	7637.2	5174.0
2008	12	86899.3	8809.7	16690.3	3742.4	34	37989.5	4300.2	9554.7	5233.8
2009	39	13717.9	10849.2	22087.7	6049.8	67	9589.4	6882.5	15121.5	4242.4
Total	216	10409.6	4717.1	12590.5	4360.9	501	5604.4	2499.2	8364.7	4027.6

Table 2
Descriptive statistics for pensions of defaulting firms

Panel A considers defaulting firms with DB plans. For each of the five years before defaults, this panel reports descriptive statistics for firms' pension information. *%UF* is the level of DB underfunding divided by plans' total assets. *UF* is the level of underfunding in millions. *EMPO* is the company stock in pensions. *EMPO (% of shr)* is the fractions of the firm's shares outstanding owned by pension plans. *EMPO (% of assets)* is the fraction of company stock investment in pension assets. *Contributions/firm contributions* are the firm's contributions to pension plans in millions. Panel B considers defaulting firms with DC plans. *Employee contributions* are employees' contributions to pensions in millions.

Panel A: Defaulting firms with DB plans

Year	# of	%*UF*		*UF* > 0	%*UF*	*UF* ($mil) if *UF* > 0		*UF* (%) if *UF* > 0		% with	*EMPO* (% of shr)		*EMPO* (% of assets)		*Contributions*
	obs.	Mean	Median		> 10%	Mean	Median	Mean	Median	*EMPO*>0	Mean	Median	Mean	Median	($mil)
-5	169	455.4%	-2.9%	40.8%	24.9%	75.8	6.8	1163.1%	13.4%	5.9%	0.8%	0.4%	3.6%	2.9%	12.1
-4	175	-6.4%	-2.6%	46.9%	31.4%	73.8	3.4	21.8%	20.7%	6.9%	0.7%	0.2%	2.1%	0.8%	12.5
-3	189	-7.1%	-1.4%	47.6%	31.2%	88.9	5.3	24.0%	15.6%	5.3%	1.5%	0.5%	4.0%	3.0%	12.5
-2	172	0.9%	3.5%	54.1%	39.0%	110.9	6.8	25.7%	17.8%	5.2%	1.2%	0.5%	3.7%	3.0%	13.9
-1	131	5.0%	9.3%	65.6%	47.3%	108.0	10.4	23.7%	19.3%	1.5%	0.2%	0.2%	2.5%	2.5%	4.5

Panel B: Defaulting firms with DC plans

Year	# of obs.	% with EMPO > 0	EMPO (% of shr)		EMPO (% of assets)		Firm contributions	Employee contributions
			Mean	Median	Mean	Median	($mil)	($mil)
-5	353	23.8%	2.5%	1.5%	22.4%	15.5%	4.3	14.1
-4	386	24.9%	2.2%	1.1%	21.0%	13.5%	4.1	13.7
-3	436	23.9%	1.9%	1.1%	17.8%	10.5%	4.4	12.4
-2	416	25.5%	2.3%	1.4%	14.8%	9.8%	4.3	11.9
-1	346	24.3%	2.3%	1.4%	11.9%	5.1%	4.4	11.7

Table 3
Determinants of defaults for firms with DB plans

This table shows the result from the estimation of a discrete time hazard model for the default probability of firms with DB plans. Standard errors are adjusted as in Shumway (2001). The sample period is 1992-2009. D_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded and zero otherwise. *Underfunding* is the pension liabilities minuses the total pension assets (in millions). PCT_{uf} is *underfunding* divided by total pension assets. $EMPO_{-3}$ is the fraction of the firm's shares outstanding owned by DB plans in year -3. D^{EMPO}_{-3} is a dummy equal to 1 if DB plans own company stock in year -3 and zero otherwise. *Sales growth* is the annual percentage change in sales. *Change in EBITDA/sales* is the annual percentage change in EBITDA/sales. *Leverage* is the firm's total liabilities divided by total assets. *Return* is the firm's cumulative stock return in the past 12 months. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Default = 1	*Default = 1*	*Default = 1*	*Default = 1*
D_{uf}	0.48***	0.48***	0.49***	0.56***
	(3.29)	(3.29)	(3.34)	(3.54)
Duf × underfunding		0.00	-0.03	
		(0.68)	(-0.74)	
Duf × PCTuf				
$EMPO_{-3}$				-130.61*
				(-1.83)
Duf × $EMPO_{-3}$				121.27*
				(1.66)
D^{EMPO}_{-3}				-0.42
				(-1.11)
Sales growth	-0.14	-0.14	-0.14	-0.28
	(-0.45)	(-0.45)	(-0.46)	(-0.89)
Change in EBITDA/sales	-0.00**	-0.00**	-0.00**	-0.00*
	(-2.23)	(-2.23)	(-2.23)	(-1.77)
Leverage	0.04***	0.04***	0.04***	0.08***
	(2.87)	(2.87)	(2.82)	(5.17)
Return	-2.08***	-2.09***	-2.08***	-2.28***
	(-7.47)	(-7.47)	(-7.47)	(-7.47)
Intercept	-5.11***	-5.11***	-5.11***	-6.96***
	(-10.02)	(-10.02)	(-10.01)	(-6.27)
Year dummies	Yes	Yes	Yes	Yes
Obs.	23,011	23,011	23,011	19,759
Pseudo R-squared	0.111	0.111	0.112	0.130

Table 4
Determinants of defaults for firms with DC plans

This table shows the result from the estimation of a discrete time hazard model for the default probability of firms with DC plans. Standard errors are adjusted as in Shumway (2001). The sample period is 1992-2009. *EMPO* is the fraction of the firm's shares outstanding owned by DC plans. *EMPO1* is the fraction of the firm's shares outstanding owned by DC plans if it is more than 1% and zero otherwise. *EMPO5* is the fraction of the firm's shares outstanding owned by DC plans if it is more than 5% and zero otherwise. *Sales growth* is the annual percentage change in sales. *Change in EBITDA/sales* is the annual percentage change in EBITDA/sales. *Leverage* is the firm's total liabilities divided by total assets. *Return* is the firm's cumulative stock return in the past 12 months. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
	Default = 1	*Default = 1*	*Default = 1*
EMPO	2.27***		
	(3.00)		
EMPO1		2.27***	
		(3.02)	
EMPO5			2.39***
			(3.34)
Sales growth	-0.01	-0.01	-0.01
	(-0.82)	(-0.82)	(-0.83)
Change in EBITDA/sales	-0.00	-0.00	-0.00
	(-0.16)	(-0.16)	(-0.15)
Leverage	0.00***	0.00***	0.00***
	(2.73)	(2.73)	(2.72)
Return	-1.52***	-1.52***	-1.51***
	(-10.74)	(-10.74)	(-10.74)
Intercept	145.89***	145.64***	145.97***
	(384.14)	(289.50)	(384.58)
Year dummies	Yes	Yes	Yes
Obs.	73,663	73,663	73,663
Pseudo R-squared	0.0660	0.0660	0.0662

Table 5
Bankruptcy frequencies and other characteristics

Panel A considers firms filing for bankruptcies with and without pension information in the IRS 5500 database and reports the number of bankruptcies, the bankrupted firms' assets (in million), sales (in million), and the number of employees on the last reporting date prior to defaults for each year from 1992-2009. Panel B considers firms filing for bankruptcies with DB and DC plans and reports the number of bankruptcies, the bankrupted firms' assets (in million), sales (in million), the number of employees, and the number of employees covered by the pension plans on the last reporting date prior to defaults for each year from 1992-2009. Panel C considers firms filing for bankruptcies and having DB plans. Panel D considers firms restructuring out of court and having DB plans. For each of the five years before defaults, this panel reports descriptive statistics for firms' pension information. *%UF* is the level of DB underfunding divided by plans' total assets. *UF* is the level of underfunding in millions. *EMPO* is the company stock in pensions. *EMPO (% of shr)* is the fractions of the firm's shares outstanding owned by pension plans. *EMPO (% of assets)* is the fraction of company stock investment in pension assets. *Contributions/firm contributions* are the firm's contributions to pension plans in millions. Panel E considers firms filing for bankruptcies and having DC plans. Panel F considers firms restructuring out of court and having DC plans. *Employee contributions* are employees' contributions to pensions in millions.

Panel A: All bankruptcies

In IRS 5500					Not in IRS 5500			
Year	#	Assets	Sales	Employees	#	Assets	Sales	Employees
1992	18	1771.1	496.0	3619.5	4	428.0	540.6	3227.5
1993	13	342.0	290.6	2563.1	1	214.2	194.9	640.0
1994	4	271.9	578.4	4467.5	1	54.0	86.4	607.0
1995	13	744.2	655.6	4779.5	2	483.9	961.5	8007.5
1996	6	387.9	209.5	1587.8	3	263.6	163.1	4000.0
1997	10	1201.4	742.4	4503.5	3	708.5	1203.0	33890.0
1998	21	644.6	928.4	6671.4	2	1063.8	94.9	121.5
1999	31	1050.2	856.8	12896.5	8	866.6	220.7	3272.1
2000	42	1237.1	945.1	6397.4	9	1678.8	2904.2	9990.9
2001	63	2430.5	2597.8	6116.1	13	1444.9	841.3	6244.1
2002	42	5188.8	3195.8	11350.3	5	10807.9	1543.6	6548.0
2003	21	990.4	1527.9	5334.0	7	1041.9	323.3	1151.4
2004	18	398.4	371.3	2509.8	0			
2005	17	7913.3	5750.3	26946.6	1	777.1	968.7	3025.0
2006	8	308.6	421.4	2262.0	2	962.8	393.2	4577.0
2007	7	405.2	771.7	9494.4	0			
2008	27	40646.8	4446.0	10777.4	1	173.4	11.6	15.0
2009	35	8445.4	7013.3	14615.6	2	18684.3	1384.0	3400.0
Total	396	5281.3	2340.1	8601.1	64	2349.9	968.9	6267.9

Panel B: Bankruptcies of firms with DB and DC plans

Firms with DB plans						Firms with DC plans				
Year	#	Assets	Sales	Employees	Plan participants	#	Assets	Sales	Employees	Plan participants
1992	6	2941.4	731.2	6947.7	4875.7	18	1771.1	496.0	3619.5	1644.8
1993	9	379.1	245.5	3089.0	631.9	11	352.9	295.2	1490.2	741.9
1994	1	170.7	117.3	900.0	739.8	4	271.9	578.4	4467.5	1740.8
1995	4	1485.0	1420.3	10547.3	4486.1	12	792.3	667.5	5177.8	1833.0
1996	2	197.2	254.2	2325.0	1530.0	5	453.8	239.5	1775.4	1125.4
1997	4	2609.5	1290.1	7668.0	3975.2	10	1201.4	742.4	4503.5	2599.9
1998	6	1053.8	2044.9	14092.7	4629.1	21	644.6	928.4	6671.4	2451.9
1999	8	1385.2	1048.7	10359.6	1584.2	31	1050.2	856.8	12896.5	7525.6
2000	21	1809.9	1192.8	6223.2	752.1	39	951.0	928.6	6683.9	2015.0
2001	27	4381.8	5206.6	8430.2	3342.6	61	2477.5	2666.0	6038.3	2764.2
2002	24	7972.4	4966.1	15458.4	8624.3	41	5237.7	3248.5	11627.1	8084.1
2003	12	1297.0	2263.6	7436.7	2866.4	20	1029.8	1590.4	5564.0	4092.8
2004	7	347.9	396.3	2463.6	534.5	18	398.4	371.3	2509.8	1191.9
2005	8	10621.7	8884.3	42138.5	11649.8	16	8247.8	5911.0	27825.1	13611.4
2006	1	300.2	350.8	905.0	0.0	8	308.6	421.4	2262.0	2197.5
2007	1	124.7	139.5	988.0	424.7	7	405.2	771.7	9494.4	6373.3
2008	10	104194.8	10473.3	19550.1	4438.0	27	40646.8	4446.0	10777.4	5704.9
2009	22	12050.9	10600.3	20604.9	6071.0	33	8904.0	7350.8	15382.0	3755.0
Total	173	10482.8	4410.3	12363.8	4253.0	382	5408.4	2391.8	8758.8	4248.7

Panel C: Firms with DB plans and file for bankruptcies

Year	# of	%*UF*		*UF* > 0	%*UF*	*UF* ($mil) if *UF* > 0		*UF* (%) if *UF* > 0		% with	*EMPO* (% of shr)		*EMPO* (% of assets)		*Contributions*
	obs.	Mean	Median		> 10%	Mean	Median	Mean	Median	*EMPO*>0	Mean	Median	Mean	Median	($mil)
-5	135	-12.0%	-2.8%	43.7%	28.1%	50.2	6.6	19.2%	15.2%	6.7%	0.7%	0.3%	3.8%	4.1%	14.0
-4	141	-5.6%	-1.7%	48.2%	31.9%	84.0	2.8	21.1%	20.0%	7.8%	0.5%	0.2%	1.9%	0.6%	14.3
-3	156	-6.0%	-1.6%	46.8%	32.1%	104.9	5.3	25.7%	15.6%	5.1%	0.8%	0.4%	4.0%	1.5%	13.9
-2	141	2.2%	3.8%	55.3%	39.7%	126.5	5.9	26.7%	18.8%	6.4%	1.2%	0.5%	3.7%	3.0%	15.7
-1	103	6.3%	8.8%	67.0%	45.6%	124.4	8.4	24.4%	19.2%	1.9%	0.2%	0.2%	2.5%	2.5%	4.8

Panel D: Firms with DB plans and restructure out of court

Year	# of	%*UF*		*UF* > 0	%*UF*	*UF* ($mil) if *UF* > 0		*UF* (%) if *UF* > 0		% with	*EMPO* (% of shr)		*EMPO* (% of assets)		*Contributions*
	obs.	Mean	Median		> 10%	Mean	Median	Mean	Median	*EMPO*>0	Mean	Median	Mean	Median	($mil)
-5	36	2182.9%	-2.9%	25.0%	11.1%	251.8	14.1	8790.7%	9.5%	2.8%	1.6%	1.6%	1.7%	1.7%	4.2
-4	34	-9.6%	-8.8%	41.2%	29.4%	24.5	15.1	25.6%	22.8%	2.9%	2.9%	2.9%	3.8%	3.8%	5.3
-3	35	-21.0%	-5.3%	45.7%	22.9%	19.9	4.3	16.6%	11.4%	5.7%	4.4%	4.4%	4.1%	4.1%	5.0
-2	30	-6.0%	-1.8%	46.7%	33.3%	29.6	10.1	20.2%	15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	5.4
-1	29	-0.2%	10.9%	58.6%	51.7%	41.6	18.0	20.9%	21.3%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1

Panel E: Firms with DC plans and file for bankruptcies

Year	# of obs.	% with EMPO > 0	EMPO (% of shr)		EMPO (% of asset)		Firm contributions	Employee contributions
			Mean	Median	Mean	Median	($mil)	($mil)
-5	255	25.5%	2.4%	1.5%	20.6%	14.4%	4.7	14.4
-4	289	27.0%	2.1%	1.1%	20.2%	12.5%	4.6	13.8
-3	335	24.2%	1.8%	1.1%	17.0%	9.3%	4.5	12.4
-2	320	26.6%	2.3%	1.6%	13.8%	9.8%	4.4	11.9
-1	260	25.8%	2.2%	1.4%	9.2%	4.4%	4.5	10.7

Panel F: Firms with DC plans and restructure out of court

Year	# of obs.	% with EMPO > 0	EMPO (% of shr)		EMPO (% of asset)		Firm contributions	Employee contributions
			Mean	Median	Mean	Median	($mil)	($mil)
-5	95	20.0%	2.8%	1.7%	28.4%	20.0%	3.3	13.8
-4	94	19.1%	2.7%	1.8%	24.4%	17.8%	2.9	13.8
-3	103	22.3%	2.1%	1.0%	22.0%	14.8%	4.0	12.4
-2	95	21.1%	2.3%	1.1%	19.3%	10.9%	4.1	12.1
-1	88	19.3%	2.4%	0.6%	21.0%	9.1%	3.9	14.5

Table 6
Distribution of restructuring types

This table presents the number and percentage of defaults by restructuring types for 597 defaults in 1992-2009.

	Chapter 11 (not pre-packed)	Pre-packed Chapter 11	Distress Exchange	Other out-of-court
All	383	77	85	52
	64.2%	12.9%	14.2%	8.7%
w/ pension info	332	64	75	45
	64.3%	12.4%	14.5%	8.7%
w/o pension info	51	13	10	7
	63.0%	16.0%	12.3%	8.6%
w/ DB plans	146	27	28	15
	67.6%	12.5%	13.0%	6.9%
w/ DC plans	318	64	75	44
	63.5%	12.8%	15.0%	8.8%
DB plans only	14	0	0	1
	93.3%	0.0%	0.0%	6.7%
DC plans only	186	37	47	30
	62.0%	12.3%	15.7%	10.0%
DB & DC	132	27	28	14
	65.7%	13.4%	13.9%	7.0%

Table 7
Determinants of filing for bankruptcies after defaults for firms with DB plans

This table shows the result from the estimation of a logit model for the probability of firms with DB plans filing for bankruptcies after defaults. The sample period is 1992-2009. D_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded and zero otherwise. D^{10}_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded for more than 10% of total plan assets and zero otherwise. D^{15}_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded for more than 15% of total plan assets and zero otherwise. D^{25}_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded for more than 25% of total plan assets and zero otherwise. *Sales growth* is the annual percentage change in sales. *Change in EBITDA/sales* is the annual percentage change in EBITDA/sales. *Leverage* is the firm's total liabilities divided by total assets. *Return* is the firm's cumulative stock return in the past 12 months. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Bankruptcy = 1	*Bankruptcy = 1*	*Bankruptcy = 1*	*Bankruptcy = 1*
D_{uf}	0.41			
	(0.94)			
D^{10}_{uf}		0.08		
		(0.20)		
D^{15}_{uf}			0.04	
			(0.10)	
D^{25}_{uf}				0.48
				(0.98)
Sales growth	0.54	0.48	0.48	0.53
	(1.13)	(1.06)	(1.05)	(1.12)
Change in EBITDA/sales	-0.02	-0.02	-0.02	-0.02
	(-0.64)	(-0.70)	(-0.69)	(-0.81)
Leverage	0.67	0.70	0.71	0.73
	(1.22)	(1.28)	(1.30)	(1.38)
Return	-0.94**	-0.97**	-0.97**	-1.03**
	(-2.04)	(-2.07)	(-2.06)	(-2.23)
Intercept	0.69	0.75	0.75	0.69
	(0.55)	(0.60)	(0.59)	(0.54)
Year dummies	Yes	Yes	Yes	Yes
Obs.	216	216	216	216
Pseudo R-squared	0.123	0.118	0.118	0.123

Table 8
Determinants of filing for bankruptcies after defaults for firms with DC plans

This table shows the result from the estimation of a logit model for the probability of firms with DC plans filing for bankruptcies after defaults. The sample period is 1992-2009. *EMPO* is the fraction of the firm's shares outstanding owned by DC plans. *EMPO1* is the fraction of the firm's shares outstanding owned by DC plans if it is more than 1% and zero otherwise. *EMPO5* is the fraction of the firm's shares outstanding owned by DC plans if it is more than 5% and zero otherwise. *Sales growth* is the annual percentage change in sales. *Change in EBITDA/sales* is the annual percentage change in EBITDA/sales. *Leverage* is the firm's total liabilities divided by total assets. *Return* is the firm's cumulative stock return in the past 12 months. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
	Bankruptcy = 1	*Bankruptcy = 1*	*Bankruptcy = 1*
EMPO	8.56**		
	(2.11)		
EMPO1		8.17**	
		(2.11)	
EMPO5			5.65**
			(2.07)
Sales growth	-0.06	-0.06	-0.06
	(-1.62)	(-1.62)	(-1.61)
Change in EBITDA/sales	-0.01	-0.01	-0.01
	(-0.98)	(-0.98)	(-1.05)
Leverage	0.09	0.09	0.08
	(0.35)	(0.35)	(0.32)
Return	-0.34	-0.35	-0.38
	(-1.36)	(-1.39)	(-1.51)
Intercept	18.62***	18.62***	18.62***
	(17.17)	(17.18)	(17.71)
Year dummies	Yes	Yes	Yes
Obs.	501	501	501
Pseudo R-squared	0.0817	0.0812	0.0773