Corporate Pensions and Financial Distress

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Abstract

We examine the role of corporate pension plans in determining how firms restructure in financial distress. Both defined benefit (DB) and defined contribution (DC) plans can have significant exposures to the company's own stock, imposing significant losses on employees if the firm defaults and/or files for bankruptcy. We find that firms with DB plans typically have little exposure to the stock prior to default; the degree of underfunding increases significantly as firms near default, but is not related to restructuring types (bankruptcies versus out of court restructurings). In contrast, large exposures to company stock in DC plans often are not reduced prior to default. High levels of own-company stock ownership are positively related to default and bankruptcy probabilities. Our evidence suggests a link between employee-ownership related managerial entrenchment and default risk.

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1. Introduction

Ballooning pension costs have been cited as an important contributor to the defaults and bankruptcies of many high profile U.S. corporations in the airline, auto manufacturing, and steel industries, among others. Upon a default, employees can face significant costs through reduced wages and job security, as well as through losses in pension benefits. For example, participants in defined benefit (DB) plans often lose a large fraction of benefits if a firm enters bankruptcy and terminates a plan, since coverage from the Pension Benefit Guarantee Corporation (PBGC) is often lower than benefits under an ongoing plan (e.g., UAL and Delphi Corp). Participants in defined contribution (DC) plans can incur large losses from retirement assets invested in the firm's own stock when the company becomes financially distressed (e.g., Enron and WorldCom). Despite such attention, no study has systematically documented the role of corporate pensions in the resolution of financial distress. In this paper, we examine whether the structure, funding, and investment of pension plan assets is related to how financially distressed firms are restructured.

We examine a sample of 729 firms public firms in the U.S. that default between 1992 and 2012, for which data on the firm's pension plan is available from Form 5500. These firms either have DB pension plans, DC pension plans, or frequently both. For firms with DB plans, the importance of pension underfunding is often cited as complicating attempts to negotiate settlements in bankruptcy cases.[1] Underfunding of DB plans can stem from reduced employer contributions and/or the poor investment performance of plan assets, particularly when the plan has invested in the defaulting firm's own stock.[2]

DB plans have experienced large declines in number in the last two decades. In contrast,

[1] Helwege (1999) also finds that complex liabilities such as pensions are the most significant factor in explaining the length of time that high yield bond issuers spend in default. More anecdotal evidence from corporate turnaround expert Robert "Steve" Miller attributes the difficulties experienced by many firms in Chapter 11 in the distress resolution process to pension underfunding (TIME, October 17, 2005).

[2] Under ERISA, DB plans are able to invest up to 10% of plan assets in company stock; we show below that DB plans typically invest substantially less than permitted.

defined contribution plans have experienced steady growth and become pivotal in the U.S. retirement system. One of the most striking features of DC plans is the high percentage of assets frequently invested in the sponsor company's stock.[3] The lack of diversification from high levels of own-company stock ownership can impose substantial costs on plan participants, particularly in firms' financial distress.[4] In spite of the risk such ownership imposes on employees when the firm becomes distressed, this form of ownership 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), and implies a reduced likelihood and severity of financial distress for firms with higher exposures to company stock in pensions. Further, in the state of financial distress, employees with higher pension exposures to their company's stock 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 (Benmelech et al, 2011). 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 as a means of entrenchment. Jensen and Meckling (1976) list strong relations between management and employees as a non-pecuniary benefit enjoyed by managers, which has led to management-

[3] ERISA exempts investment in the employers own stock from diversification rules. 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*). See Bernartzi (2001), Choi et al. (2003) and Cohen (2008). Brown, Liang, and Weisbenner (2006) discuss the pros and cons of employee ownership of own-company ownership stock in DC plans.

[4] 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). These plans' large allocations to company stock prompted the Pension Protection Act of 2006 to include a model notice plan sponsors must distribute to participants when investment in employer-sponsored securities exceeds 20% of plan assets.

employee allies in many proxy contests (e.g., Stulz, 1988; Pagano and Volpin, 2005). Besides management-employee bonding, employees that are interested in job retention are more likely to side with incumbent management in proxy contests. Thus, employee ownership in pensions can serve as an effective takeover defense (Rauh, 2006; Coco and Volpin, 2013). Under this entrenchment view, firms with higher exposures to company stock in pension plans are expected to have more agency problems and lower operational efficiency, implying a higher likelihood and severity of financial distress. Because the motivational and entrenchment views have opposite predictions, the influence of pensions' own-company stock ownership on the likelihood and resolution process of financial distress is an empirical question. We explore this issue in our analyses for both firms with DB and DC plans.

We first examine the behavior of underfunding for DB plans, and own-company stock ownership for DB and DC plans, in the period leading to default. While it is not obvious, ex-ante, that underfunding should increase significantly for all firms pre-default, we observe that almost 2/3 of DB plans are substantially underfunded by the time of default. Investment in own-company stock does not appear to drive the magnitude of the underfunding, as less than 7% of DB plans have any such investment even before the onset of distress.[5] The observed decline in firm contributions to the plan likely drives the underfunding, as firms' cash flows decline pre-default. Using a Cox proportional hazard model for the time to default, which controls for other factors such as firm size, age, profitability, and stock returns, we confirm the significant relationship between underfunding of DB plans and default risk.

Because underfunding is not relevant for DC plans, we focus on these plans' exposures to

[5] Increased risk of pension investments nearing default is also unlikely to explain the extent of underfunding. Rauh (2006) finds no support for risk shifting as firms near underfunding thresholds, defined as increased investment in equities. Anantharam and Lee (2013) find weak evidence of risk shifting in pension investments as firm credit quality declines.

own-company stock. While the lack of diversification from investing in the stock can impose significant losses on employees upon default, and particularly upon bankruptcy filings, these losses might be avoided if managers and employees have private information about the decline in firm value and act to reduce these exposures pre-default. However, we find that large investments in own-company stock exhibit little variation in the years leading to default, consistent with prior literature documenting inertia in pension plan allocation choices (Agnew, Balduzzi, and Sunden (2003)). Further, contributions to DC plans by both employees and sponsor firms are stable in the years prior to defaults, indicating that neither party proactively reduces the employees' exposures. This is despite the fact that we concurrently observe large declines in the stock price, as well as decreases in institutional ownership and increases in short interest in the stock, meaning that the firm's decline is publicly observable.

Our hazard model predicting default shows a non-linear relationship between own-company stock ownership and default; firms with lower levels of such investment have a lower likelihood of default relative to firms with no ownership of own-company stock. However, firms with significantly higher levels (more than 10%) of such ownership exhibit higher default probabilities. These findings are consistent with the poor performance and increased default risk of firms that use employee ownership of stock via their DC pension plan as a means of entrenchment.

Lastly, conditional on default, we examine how pension plan characteristics are related to whether distressed firms restructure in bankruptcy or through out of court restructurings. For DB plans, underfunding has been suggested to increase incentives to file for bankruptcy, since it is then possible to shift the underfunded liability to the PBGC. In our sample of bankruptcies with DB plans, we find that only 20% of cases in fact terminate the plan and transfer the assets to the

PBGC. Further, logit regressions for the probability of a bankruptcy filing show no significant relationship between underfunding and the likelihood of bankruptcy. Many of the filing firms may not be able to demonstrate that the reorganized firm would not be viable without terminating the plan; other firms may avoid larger restructuring costs in bankruptcies which involve complex liabilities such as DB pensions. Thus, our findings cast doubt on the argument that defaulting firms often opt for bankruptcies to terminate underfunded pensions, a practice not allowed in out of court restructurings.

For firms with DC plans, we find that firms with plans investing in the own-company stock are more likely to file for bankruptcy than to restructure out of court. Other studies have shown that in recent time periods (such as that of our sample), pre-bankruptcy equity holders most often receive no distribution in bankruptcy (Hotchkiss, Stromberg, Smith (2014); Bharath, Panchapagesan, and Werner (2010)). Our regressions control for the degree of financial distress; still, if firms filing for bankruptcy rather than restructuring have experienced greater declines by the time of default, the losses imposed on employees from their pension investment in own-company stock are greater.

Our paper is the first 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.[6] 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

[6] Prior literature on financial distress focuses on effects on top management (Eckbo, Thorburn and Wang (2014); see also Hotchkiss, John, Mooradian, and Thorburn (2008) for a review). Our results also complement those of Graham, Li, and Qiu (2014) who examine wage losses for employees of bankrupt firms.

[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.

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 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 from 1992 to 2012 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. We omit defaulting firms that do not have financial data available from Compustat within 3 years of the default.

Data on corporate pension plans are from the IRS 5500 research files, available from the Department of Labor (DOL). The IRS 5500 Schedules H and B contain pension asset and

[8] A distressed exchange is defined by Moody's as: an exchange of 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 enable the borrower to avoid default. See Moody's Corporate Risk Default Service (2007).

liability values as of the beginning and end of the plan year, and must be filed annually by 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/or company names. We identify pension information for 726 defaulting and 9,749 non-defaulting firms in the Compustat/5500 matched dataset.

2.2. Descriptive statistics

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

(Table 1 about Here)

Panel A of Table 1 presents summary statistics over time for the financial characteristics of the 726 defaults in our sample, and for comparison provides the same summary statistics for defaulting firms for which pension data is not found in the IRS 5500 database.[10] Both groups consist of large firms, with mean total assets of 2.8 and 3.4 billion, respectively. Based on reported revenues and number of employees, the firms without Form 5500 data are slightly smaller. Consistent with other research, the largest yearly concentrations of defaults occur in the economic downturn of the early 2000s and subsequent to the onset of the financial crisis (2008).

In Panel B of Table 1, we show whether the 726 firms with pension data available have defined benefit (DB) or defined contribution (DC) plans. Note that 297 defaulting firms have both DB and DC plans (and are therefore included in statistics for both the DB and DC groups), 408 firms have only DC plans, and 21 firms have only DB plans. Therefore, in total, 705 defaults

[9] Prior to 2008, actuarial valuations of pension plan assets and liabilities were reported in IRS 5500 Schedule B. 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 not included in our sample.

[10] Based on our reading of 10Ks, pensions of these firms typically do not have a sufficient number of participants covered by pension benefits to require filing Form 5500, have only coverage for non-US employees of the firm, or have only multi-employer plans.

involve firms with DC plans, and 318 involve firms with DB plans, but relatively few of those DB firms do not also have DC plans. This is consistent with the trend starting in the 1980s toward replacing DB with DC plans (Rauh, Stefanescu, and Zeldes, 2013). Firms with DB plans are larger, with average assets of $4.5 vs. $2.9 billion respectively, consistent with the perception that firms with DB plans are older and in more mature industries. Panel B also reports the number of employees covered by the pension plans in the IRS 5500 database. DB plans cover roughly one third of firms' employees and DC plans roughly half. Thus, restructuring decisions affecting pension assets of the company will impact a large proportion of the firm's employees. For firms having more than one DB or more than one DC plan, we aggregate characteristics across plans of the same type.[11]

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

We next provide descriptive statistics for the key pension variables of defaulting firms. Panels A and B of Table 2 report statistics separately for characteristics of DB and DC plans, respectively, since the primary concerns related to the pensions and their expected effect on incentives in restructuring differ by the plan type.

(Table 2 about Here)

Panel A shows pension plan characteristics of the defaulting firms with DB plans. We first report summary statistics for plan funding, using all observations with non-missing pension information in each of the five years prior to default.[12] We calculate the level of plan underfunding by subtracting total assets of the plan from the current liability of total benefits due

[11]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.

[12] Note that while our sample consists of 318 defaulting firms with DB plans, not all firms have data on plan assets and liabilities available for each of the five years leading to default.

to all plan participants (such that negative underfunding indicates the plan is overfunded). This measure is the common definition used by the PBGC and by Benmelech et al. (2011). We also calculate the percentage underfunding by dividing the total plan assets by the firm's underfunding level.

Underfunding increases as firms approach distress, indicating the difficulty these firms experience as the firm's cash flows decline. While on average plans are fully funded at year -5, the mean and median percentage underfunding indicate that by years -3 or -4 relative to default, DB plans are frequently underfunded. By the year end prior to the year of default, almost two-thirds (65%) of the defaulting DB firms have underfunded their plan, and 49.7% have underfunding levels greater than the 10% level which triggers mandatory contributions to restore the funding level.[13] Conditional on the plan being underfunded, mean (median) underfunding reaches $64.2 million ($9.5 million), and 23.7% (22.7%) of plan assets. Thus, the growing fraction of firms with deep underfunding further illustrates the pressures firms face from the funding requirements of their pensions when approaching default.[14] In the event a firm enters bankruptcy and terminates its DB plan, these underfunding levels represent the magnitude of obligations firms can transfer to the PBGC.[15]

It is not obvious, ex ante, that underfunding should substantially increase as firms approach default. But there are two main reasons why the increase in underfunding likely occurs.

[13] 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. See Rauh (2006) for description of required contributions when funding levels fall below these thresholds.

[14] Similar to Benmelech et al. (2011), we calculate the percentage of underfunding as a percentage of total plan assets rather than 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.

[15] Most DB plans are covered by the PBGC guarantee. Thus, employees do not lose all of their pension benefits in distressed terminations. However, the PBGC imposes benefit limits based on the participants' ages, which can be significantly lower than what a participant would be entitled to if the plan were not terminated. In 2012, the PBGC limits for 55-, 60-, and 65-years-old participants are $25,158, $36,296, and $55,841, respectively. See Benmelech, Bergman, and Enriquez (2011) for further discussion of these limits.

The first is that as cash flows decline in financial distress, the firm decides not to (such that the firm would not need to cut capital expenditures), or is unable to (such that it would not have cash flow sufficient to make scheduled debt payments) make full contributions to the plan. The last column of Panel A shows that mean contributions decline from $9.4 million per year to $5.4 million in the last year prior to default. The second reason for increased underfunding is the poor performance of investments of plan assets. Firms are more likely to default in periods of poor economic conditions, such that returns on investments may concurrently decline. Further, DB plans may invests up to 10% of plan assets in the defaulting firm's own stock, and suffer losses as the value of that investment severely declines.

Panel A further describes the defaulting firms' exposures to company stock in their DB plans. In any of the years prior to default, at most 8% of the firms have any investment in their own-company stock. Even at year -5, the mean (3.8% of plan assets) and median (3.6%) exposures are well below the 10% limitation. Thus, it is unlikely that the declining value of the firm's own stock contributes significantly to the level of underfunding across all DB firms. For firms that do have a positive investment in the stock, the median levels of investment as a percentage of shares outstanding show that this investment is also reduced as the firms approach default, allowing these firms to avoid some losses on their investment. As a percentage of plan assets, the stock ownership mechanically falls as the stock price declines prior to default.

Figure 1 provides some further insight into changes in the firm's ownership structure prior to default. Rather than using financial year end reporting windows, we determine the Form 5500 pension plan information within a calendar year preceding default; we call this date time -1. We then trace ownership changes for the firm for one year periods prior to this date, and report means of the variables we plot. The decline in the company's stock price (shown on right hand

axis) is clear from these plots; in the final year prior to default there is a significant decline in institutional ownership (using data from Thomson), and short interest in the stock increases over a long window. These patterns further indicate that the firm's decline is not private information. The third panel shows that own-stock ownership is not large overall, and does not show a clear decline in the average investment.

In sum, distressed firms significantly reduce contributions to DB plans, and levels of underfunding become significant. Conditional on default, greater underfunding may create incentive to restructure in bankruptcy court if liabilities can be shifted to the PBGC by terminating a DB plan in bankruptcy. On the other hand, if negotiations with pension claimants or the PBGC are difficult, firms may be more likely to attempt to restructure out of court, if not take actions to avoid default altogether. Investments in defaulting firm's own stock are in practice significantly lower than ERISA limits, but firms that do make such investments in their DB plans on average reduce this exposure prior to default.

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

Panel B of Table 2 reports summary statistics for the DC plans of defaulting firms. Unlike DB plans, sponsors of DC plans are not committed to fixed levels of retirement benefits for their employees, and can choose whether and how much to match employee contributions to the plan – i.e. there is no problem of underfunding for these firms/plans. At the same time, there is no limitation on the percentage of DC plans' assets that can be invested in own-company stock. In fact, ERISA specifically excludes investment in the firm's own stock in diversification guidelines for DC plans. The pro and cons of employee own-company stock ownership are described in Section 1 above.

Panel B shows characteristics of the own-company stock ownership of DC plans in the

years leading to default, based on firms with non-missing pension information in a given year. Approximately 25% of defaulting firms have positive ownership of their stock in any year. Conditional on non-zero ownership, we report own-company stock ownership as a percentage of shares outstanding and as a percentage of assets in the DC plan. As a percentage of shares outstanding, the mean and median exposures are fairly stable at approximately 3% and 1.5% of shares outstanding respectively. These amounts can be a significant proportion of plan assets, on average 26.2% at year -5 before the firm is distressed. The magnitude of the investment can be quite large in some cases, reaching 39.0% at the 75th percentile and a maximum of 99.8% for one sample firm that is essentially invested entirely in the stock (Riviera Holdings Corp). As a proportion of plan assets, the percentage mechanically falls as the stock price declines; yet notably, the investment as a percentage of the firm's shares outstanding does not similarly decline.

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 $33.2 million in year -3; if the plan continues to hold the stocks until the default date, value decreases by $29.4 million to $3.8 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.

The final columns of Table 1 Panel B report the average contributions to DC plans of defaulting firms made by the sponsor firms and employees, respectively. On average in Year -5, firms contribute $4.1 million and employees contribute $8.9 million; unlike contributions to DB plans, the firm contributions to DC plans do not show an obvious decline near default. 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).[16]

The patterns of ownership approaching default are further described in Figure 2, using windows corresponding to pension plan ownership dates (as done in Figure 1 for DB plans). Similar to DB plans, as the stock price declines, there is a drop in institutional ownership and an increase in short interest. The absence of a decline in the average investment in own-company stock is evident from the final plot, particular in the final year preceding the default.

Beyond ERISA's exemption from diversification rules for investment in the firm's own stock, there has been some debate as to whether distressed firms should continue to contribute stock to a DC plan, and whether they should permit employees to continue to allocate their own contributions to this investment. In the time period we study, there is no such requirement for firms to change these investments, even as firms become distressed, and defaulting firms have been protected post-default from failing to take such actions.[17] While it is not the focus of our paper to explain the frequently observed high exposures to this stock, our paper points out the costs that are realized (and imposed on employees) in the event that a firm does default.

3. Default Probabilities

[16] It is also possible that distressed firms prefer to contribute to DC plans in stock rather than cash to preserve cash flow; based on a sampling of information provided in firm's 11-K statements, we observe no obvious evidence of a change in firm's contribution behavior. Subsequent versions of this paper will further examine whether firm's matching contributions are made in stock, and whether there are restrictions on employees from divesting this stock.
[17] See discussion in "Presumption of Company Stock," *Pension & Investments*, December 9, 2013; and "Fair Shares – Why Company Stock is a Burden For Many," *Wall Street Journal*, November 27, 2001.

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 pension's underfunding, and the second is the pension's exposures to own-company stock (with the former expected to be of greater importance). Pension underfunding is expected to increase with the probability of default (responding jointly to financial distress); underfunding represents a cash flow obligation in the near future and imposes direct pressure on a financially constrained firm. 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 (an entrenchment mechanism), such entrenchment may be associated with higher default probabilities. Further, observing that a DB plan disinvests the own-company stock may be an indicator of impending default.

To examine the relationship between the above factors and default probabilities, we employ a default prediction framework similar to the models of Shumway (2001), Chava and Jarrow (2004), Campbell, Hilscher, and Szilagyi (2008), and Bharath and Shumway (2008). Specifically, we estimate a Cox proportional hazard model that describes the conditional likelihood of default as a function of a set of time-varying explanatory covariates.

Following a large literature on default prediction models (Altman and Hotchkiss, 2005), we control for firm financial performance by including size (log of sales), sales growth, and change in EBITDA/Sales as controls. We also control for differences in leverage, measured by total liabilities divided by total assets. We examine specifications excluding and including past stock performance, measured by cumulative stock returns in the past twelve months, as there is some debate as to their relevance in default prediction (Shumway, 2001). To include as many

observations as possible, when any of the control variables is missing, we replace them with the value in the prior year (again following prior literature), and if still missing with industry median values from the same year. Industry values are measured as medians within 2-digit SIC codes. Year dummies are also included to control for changing macroeconomic conditions over time. We include observations for all defaulting and non-defaulting firms with Compustat and Form 5500 pension information. We report hazard ratios, which show the change in the likelihood of default for a one unit change in an independent variable.

(Table 3 about Here)

The hazard model estimates are shown in Table 3. The effect of size (log of sales) is less clear, and empirically it has a large positive impact on the probability of default. The additional control variables behave as expected; greater declines in profitability (EBITDA/Sales) increase the likelihood of default, and higher leverage is associated with a higher default probability. We also include firm age, as firms with DB plans are typically older/more mature, and observe that the older DB firms have a lower probability of default. Prior stock returns also appear significant in explaining defaults, consistent with Shumway (2001).

Of key interest are the variables related to DB plan underfunding. We construct a dummy variable D_{uf} to indicate the firm has an underfunded plan in a given year. We also interact this dummy variable with the level of underfunding and the percentage of underfunding (denoted by PCT_{uf}) in a given year, as defined in Section 2.2.1. These interaction terms allow us to explore the relationship between the level and percentage of pension underfunding on default probabilities. The robust finding across specifications is that firms with underfunded DB plans, and a greater degree of underfunding, have significantly higher default probabilities compared to firms with fully- or over-funded pensions. While the purpose of this part of our analysis is not to

make causal statements, this multivariate analysis confirms our descriptive evidence that underfunding increases to significant levels by the time of default. The result does not appear driven solely by the firms with the greatest underfunding (more than 10%). Thus, firms with DB plans typically impose significant losses on employees – and possibly the PBGC – should they enter bankruptcy and terminate the plan upon default.

Although the level of own-company stock ownership is low in DB plans, we also consider their impact in specifications (7) and (8) but find no significant relationship to the likelihood of default. 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 -1 ($EMPO_{-1}$), to the independent variables. We also consider the company stock exposure level in year -3 because results in Panel A of Table 2 show that some DB firms reduce or eliminate such exposures shortly before default, again finding no significant relationship. Finally, insider ownership can be viewed either as related to entrenchment, or to the incentive to avoid default to preserve equity value. Based on data available for a smaller number of firms (specification (2)), the coefficient for insider ownership is also insignificant and does not provide support for either view.

To summarize, we find a higher incidence of defaults among firms with underfunded DB plans. 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 often sell the company stock when approaching default. The strong association between pension underfunding and firms' default probabilities is unlikely to be driven by DB plans' exposures to company stock. Still, the degree of underfunding suggests a potential for significant losses to employees.

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 as before for the financial and stock performance variables. Results for DC plans are reported in Table 4.

(Table 4 about Here)

Results in column 1 indicate that increasing company stock exposures in DC plans are associated with significantly lower default probabilities: the hazard ratio for the dummy variable $D^{EMPO>0}$, indicating firms with some stock in their plan, shows that these firms are half as likely to default. This positive effect, however, is largely driven by firm with lower levels of own-company stock ownership; the significant effect continues to hold (models (4) and (5)) when we consider firms with ownership of 10% or less, using the percentage of outstanding shares rather than the indicator dummy variable. Specification (5) defines the own-stock ownership variables similarly to the ownership specifications in Morck, Shleifer, and Vishny (1988); the hazard ratio for the higher ownership firms indicates they are significantly more likely to default. Thus we observe there is a non-linear relationship, consistent with prior research suggesting the impact of management entrenchment at high levels of (pension) ownership.[18] We also find that higher insider ownership is associated with a greater default probability, though again the sample is more limited for this specification (model (2)).

Overall, our results in Table 4 suggest that increasing company stock exposures in DC plans are associated with greater default probabilities. This result is consistent with the entrenchment view of employee stock ownership through pension plans discussed in Section 1.

[18] Rauh (2006); Cocco and Volpin (2013).

Similar to our results for DB plans, our findings also show that large losses are imposed on employees for defaulting firms with high levels of own-company stock ownership.

4. Restructurings of Defaulted Firms

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. For all defaulting firms with pension information available from Form 5500, we verify the above information from additional sources including Deal Pipeline, SEC filings, and news sources. Firms which miss a payment, but subsequently file for bankruptcy, are included in the bankruptcy group.[19] 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.

4.1. Descriptive statistics

Panel A of Table 5 presents summary statistics of the financial characteristics for the firms involved in the 545 bankruptcies, either prepackaged or traditional 'free fall' Chapter 11 cases. We omit reporting summary statistics for firms restructuring out of court (through a distressed exchange or other out of court restructuring) because of their similarity to those for the bankruptcy sample. 248 of the bankrupt firms have a DB pension plan, and 529 have a DC plan. Those with DB plans appear someone larger than others.

(Table 5 about Here)

The remaining panels in Table 5 contrast the pension characteristics of firms restructuring

[19] Subsequent results are not sensitive for using the time between an initial payment default and a subsequent bankruptcy filing to classify defaults as bankruptcy or non-bankruptcy. We include only one default event per firm, unless the defaults occur more than one calendar year apart.

in versus out of court. As can be seen from Panels B and C, DB plan firms have a higher frequency of restructuring in bankruptcy. The level of underfunding, and its increase as the firm approaches bankruptcy, appear similar for both restructuring groups. Conditional on underfunding, those restructuring out of court have somewhat higher levels of underfunding. The bankruptcy cases also appear to have a higher incidence of owning own-company stock.

Panels D and E of Table 5 focus on the own-company stock ownership of firms with DC plans. Both the incidence (% with EMPO > 0) and levels (EMPO as a percentage of shares outstanding) appear higher for firms restructuring in bankruptcy. We continue to observe that ownership of own-company stock does not decline, and perhaps increases through continued contributions, even as firms come close to the time of default.

(Table 6 about Here)

The frequency of restructuring types is also shown in Table 6. Overall, 75.1% of default observations are Chapter 11 bankruptcies. Among out of court restructurings, both distressed exchanges and other more typical out of court restructurings are common. While the number of observations is low, it is interesting that no cases with DB plans only utilize prepackaged bankruptcies, perhaps due to the complexity of these cases. 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.[20] In unreported analyses, we identify the distress terminations of DB plans – we find that in only 20% of the DB-related bankruptcies in our sample, the PBGC replaces the sponsor firm as the plan trustee. This is likely related to the requirement that the bankrupt firm demonstrate that it would not be viable, and

[20] 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.

therefore could not emerge from bankruptcy, with sufficient cash flow to pay the projected DB plan benefits.[21] Thus, it is more likely that only firms with severely underfunded plans would have incentive to restructure in bankruptcy rather than out of court, which we examine empirically in the next section.

4.2. Multivariate analysis

4.2.1. Restructuring type for 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 is related to 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 a dummy variable for deep underfunding, denoted by D^{10}_{uf}, indicating pension underfunding exceeding 10% of total pension assets.

(Table 7 about Here)

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, and interestingly we

[21] Quoting the executive director of the PBGC, March 2013: "We at PBGC balance the goals of successful reorganization with the rights of workers and retirees. When companies can successfully reorganize while preserving their pension plans, we work to preserve the plan, as we did with American Airlines. When companies cannot afford to keep their plans, we step in and pay their benefits. And, as it says in our own version of the Serenity Prayer, we pray for the wisdom to know which is which." Statement of Hon. Joshua Gotbaum, field hearing of the ABI Commission to Study Reform of Chapter 11.

find no significance for these variables in any specifications.[22] These results suggest that pension underfunding is not a significant determinant of restructuring type for defaulting firms with DB plans. 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 distresses 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.

Exposures to company stock in DB plans have little relevance to defaulting firms' choices between bankruptcies and out of court restructurings. As shown in Table 5, almost all firms with DB plans in our default sample have eliminated such exposures in the year prior to default. 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. Restructuring type for defaulting firms with defined contribution (DC) pension plans

Our final tests examine the determinants of restructuring type among defaulting firms with DC plans, focusing on the plans' exposures to own-company stock (measured by the fraction of shares outstanding owned by DC plans, denoted by *EMPO*). We omit discussion of control variables for brevity. We also use the other two company stock exposure measures constructed in Section 3 for exposure levels greater or less than 10%. 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.

[22] Our control variables are similar to those used in many previous studies of the choice between in and out of court restructurings. See also Gilson, John, and Lang (1989). Subsequent versions of this paper will include measures of complexity of debt structure.

(Table 8 about Here)

The results in Table 8 show consistently that the indicator for own-company stock ownership by the plan is associated with a greater probability of restructuring in bankruptcy. The level of ownership is also significantly related to the probability of bankruptcy (at the 10% level) Interestingly, the change in ownership is negatively related to the bankruptcy probability, suggesting that the firms which continue to contribute stock to their plans or for which employees allocate new contributions to the stock have an even greater probability of a bankruptcy filing. These results do not appear to be driven by plans with the greatest exposure to own-company stock (higher than 10% of firm shares outstanding).

Overall, our results in Table 8 suggest that increasing company stock exposures in DC plans is associated with a greater likelihood that the defaulting firm files for bankruptcy rather than restructuring out of court. This result is important in two respects. First, to the extent restructuring in bankruptcy is more costly, and is more often associated with the elimination of the stock (zero payout to pre-bankruptcy equity), the losses imposed on employees are more significant. Second, rather than providing incentive to avoid a costly restructuring to preserve equity value, our findings are more consistent with the weaker performance of firms in which employee stock ownership (through the pension plan) works more as a management entrenchment mechanism than as a mechanism for motivating better performance.

5. Conclusion

This paper analyzes the role of corporate pensions in firms' financial distress. We find firms with defined benefit (DB) pension plans have low exposures to company stock prior to defaults, avoiding losses from declining stock prices. Underfunding increases significantly

leading to default, as firms with declining cash flows lower their contributions to DB plans. Greater underfunding, however, is not a significant determinant of the restructuring type (bankruptcies versus out of court restructurings) for firms with DB plans.

In contrast, many firms have large exposures to own-company stock in defined contribution (DC) plans, which exhibit little variation over time prior to firms' defaults. We find a non-linear relationship between the exposure to company stock and default risk, with lower levels of ownership negatively related to the likelihood of default and high levels positively related. Such investments impose large losses on employees upon default, particularly because investment in such stock is positively related to firms restructuring in bankruptcy rather than out of court. Overall, as suggested by prior literature, our results are consistent with a link between employee-ownership-related managerial entrenchment and increased default risk.

Our paper is also the first 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 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 reports characteristics of defaulting firms with and without pension information in the IRS 5500 database. Statistics are reported as of the last reporting date prior to default. Panel B reports the same statistics for the 726 defaulting firms with pension data, based on whether the firm has defined benefit (DB) and/or defined contribution (DC) pension plans.

Panel A: All defaults

Year	In IRS 5500				Not in IRS 5500			
	# of defaults	Assets ($millions)	Sales ($millions)	# Employees	# of defaults	Assets ($millions)	Sales ($millions)	# Employees
1992	25	1542.4	726.6	7197.2	5	941.2	707.8	3875.8
1993	21	248.0	308.3	2703.0	2	370.2	318.0	1820.0
1994	9	295.1	400.2	3690.8	1	N/A	0.0	0.0
1995	20	988.6	900.7	6241.9	2	483.9	961.5	8007.5
1996	11	528.3	372.8	1791.5	0	N/A	N/A	N/A
1997	13	1003.0	1046.3	4856.5	6	335.7	378.8	1804.5
1998	31	518.7	677.7	4783.8	3	990.4	127.0	427.3
1999	44	875.4	715.5	9964.9	18	958.1	460.3	5063.7
2000	61	1184.4	838.4	6225.4	7	1274.7	2955.6	8780.6
2001	103	2390.8	1329.8	6149.8	17	838.6	469.7	3055.8
2002	67	5250.8	2120.7	7797.6	23	3613.2	1758.8	3915.6
2003	40	1223.1	1213.0	4179.2	16	2126.0	679.9	1205.1
2004	27	847.1	736.8	4118.8	5	2167.1	1666.7	8022.0
2005	26	4411.7	3511.4	14331.0	2	223.6	118.4	109.5
2006	15	1644.4	951.8	4684.7	3	3103.9	3137.5	17718.0
2007	12	528.3	772.0	6026.5	1	155.3	4.1	0.0
2008	41	6834.5	2990.9	8891.6	8	12477.1	4167.8	12836.1
2009	95	6108.6	3022.7	9906.0	12	7111.8	1679.0	4444.5
2010	31	2929.7	1011.4	4271.8	11	9854.5	1662.6	962.4
2011	23	2060.5	1565.7	5377.9	7	1461.9	732.1	885.7
2012	11	2208.6	1889.0	6711.6	9	7940.4	1598.4	2571.8
Total	726	2816.5	1553.5	6927.1	158	3441.2	1305.8	4142.3

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	11	2174.4	1161.7	11058.4	6516.2	23	1659.3	767.8	7631.1	1510.8
1993	13	279.5	319.5	3088.2	729.0	18	234.9	307.4	2213.0	834.3
1994	3	252.3	290.6	4451.3	1218.1	9	295.1	400.2	3690.8	1855.0
1995	9	1290.0	1569.2	11642.1	3667.6	20	988.6	900.7	6241.9	1982.6
1996	3	474.4	479.1	2883.3	2150.6	10	575.2	404.2	1905.7	1211.8
1997	5	2107.8	1071.4	6217.0	3708.4	13	1003.0	1046.3	4856.5	2870.5
1998	7	891.4	1632.3	11957.1	2570.4	31	519.0	677.7	4783.8	2026.2
1999	11	1130.7	875.2	7607.1	1120.5	44	875.4	715.5	10039.5	5398.4
2000	28	1727.9	1194.7	8348.1	613.9	58	942.1	766.0	6176.6	2108.2
2001	40	4498.3	3308.1	8705.2	2792.3	98	2419.9	1314.8	6219.1	2390.0
2002	35	7328.2	3177.8	10818.9	6053.1	66	5583.7	2141.5	7901.8	4651.0
2003	21	1714.8	1767.8	6113.6	1897.3	38	1280.1	1265.7	4332.5	2962.4
2004	12	1248.5	1171.9	5699.3	611.3	26	815.3	631.8	2931.1	1173.9
2005	12	4051.9	4754.8	20733.1	3289.8	25	4557.1	3613.1	15045.6	9636.0
2006	4	756.4	915.6	5343.5	326.8	15	1644.4	951.8	4684.7	2834.1
2007	3	367.1	412.7	1445.3	172.3	12	528.3	772.0	6026.5	4257.6
2008	18	9075.6	5798.1	8898.8	3122.3	41	7270.2	2990.9	8971.6	4411.3
2009	63	8399.9	5012.1	14249.3	4992.6	94	6447.3	3030.9	10112.4	3983.2
2010	8	6451.9	2695.1	8426.3	1241.9	30	1586.2	781.4	4252.5	1433.0
2011	5	7839.7	5830.8	17562.8	15039.1	23	2060.1	1565.7	5377.9	3542.3
2012	7	2516.8	2321.7	8150.4	1666.3	11	2208.6	1889.0	6711.6	3660.7
Total	318	4520.3	2946.6	10028.6	3364.4	705	2879.2	1554.2	7004.2	3286.5

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 fraction of the firm's shares outstanding owned by pension plans if it is non-zero. *EMPO (% of assets)* is the fraction of company stock investment in pension assets if it is non-zero. *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 obs.	*UF%*		*UF* > 0	*UF* ($mil) if *UF* > 0		*UF* (%) if *UF* > 0		*% UF* > 10%
		Mean	Median		Mean	Median	Mean	Median	
-5	208	-6.1%	-2.9%	45.7%	52.8	6.8	23.1%	18.4%	33.2%
-4	250	-5.8%	-1.8%	48.4%	44.5	9.1	21.4%	20.2%	34.8%
-3	258	-6.7%	1.0%	50.4%	38.3	5.6	21.1%	17.2%	36.4%
-2	249	0.0%	4.9%	57.0%	51.7	7.5	24.2%	18.0%	45.0%
-1	185	6.7%	9.9%	64.9%	64.2	9.5	23.7%	22.7%	49.7%

Year	# of obs.	% with *EMPO*>0	*EMPO* (% of shr)		*EMPO* (% of assets)		*Contributions* ($mil)
			Mean	Median	Mean	Median	
-5	208	6.3%	1.6%	1.6%	3.8%	3.6%	9.4
-4	250	8.0%	1.1%	0.3%	3.3%	2.5%	6.9
-3	258	5.0%	1.3%	0.5%	3.1%	2.1%	6.3
-2	249	4.8%	1.1%	0.5%	3.7%	3.0%	6.3
-1	185	2.7%	1.1%	0.2%	1.8%	1.8%	5.4

Panel B: Defaulting firms with DC plans

Year	# of obs.	% with EMPO > 0	*EMPO* (% of shr)		*EMPO* (% of assets)		Firm contributions ($mil)	Employee contributions ($mil)
			Mean	Median	Mean	Median		
-5	487	28.3%	3.8%	1.7%	26.2%	20.1%	4.1	8.9
-4	559	25.2%	3.0%	1.3%	20.8%	13.7%	3.6	10.3
-3	596	24.8%	3.4%	1.3%	18.0%	11.9%	3.7	8.8
-2	579	25.4%	2.9%	1.5%	12.5%	6.4%	3.4	8.8
-1	479	26.7%	3.9%	1.8%	10.8%	4.5%	3.4	9.5

Table 3
Determinants of defaults for firms with DB plans

This table shows the hazard ratios from the estimation of a Cox proportional hazard model for the default probability of firms with DB plans. The sample period is 1992-2012. Ln(*Sales*) is the natural log of sales. *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. *Firm age* is the number of years since the firm first appears on Compustat. *Return* is the firm's cumulative stock return in the past 12 months. *Insider ownership* is the fraction of shares held by management and directors. D_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded and zero otherwise. PCT_{uf} is underfunding divided by total pension assets. D^{10}_{uf} is a dummy equal to 1 if the firm's DB plans are underfunded for more than 10% and zero otherwise. *EMPO* is the fraction of the firm's shares owned by DB plans. $EMPO_{-1}$ is the fraction of the firm's shares owned by DB plans in year -1. $EMPO_{-3}$ is the fraction of the firm's shares owned by DB plans in year -3. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln(*Sales*)	1.24***	1.10	1.24***	1.24***	1.24***	1.24***	1.23***	1.29***
	(6.02)	(1.42)	(5.81)	(5.90)	(5.74)	(5.87)	(5.35)	(6.00)
Sales growth	0.99*	0.99	1.00	1.00	1.00	1.00	1.00	0.99
	(-1.91)	(-0.88)	(-0.90)	(-0.81)	(-0.84)	(-0.81)	(-0.96)	(-1.62)
Change in EBITDA/sales	1.00***	1.00***	1.00*	1.00*	1.00*	1.00*	1.00*	1.00**
	(-3.51)	(-3.24)	(-1.70)	(-1.78)	(-1.78)	(-1.79)	(-1.81)	(-2.12)
Leverage	1.04***	1.04***	1.03***	1.03***	1.03***	1.03***	1.03***	1.03***
	(20.08)	(13.49)	(17.42)	(17.45)	(17.62)	(17.44)	(16.96)	(15.59)
Firm age	0.97***	0.98**	0.97***	0.97***	0.97***	0.97***	0.97***	0.96***
	(-5.15)	(-2.50)	(-5.31)	(-5.41)	(-5.19)	(-5.40)	(-5.16)	(-5.54)
Return			0.98***	0.98***	0.98***	0.98***	0.98***	0.98***
			(-8.20)	(-8.31)	(-8.13)	(-8.31)	(-7.50)	(-6.71)
Insider ownership		1.01						
		(0.95)						
D_{uf}	1.76***	1.55**	1.63***				1.64***	1.87***
	(4.29)	(2.21)	(3.73)				(3.60)	(4.14)
Duf × *PCTuf*				1.01***				
				(3.76)				
D^{10}_{uf}					1.66***			
					(3.91)			
D^{10}_{uf} × *PCTuf*						1.01***		
						(3.55)		
$EMPO_{-1}$							0.94	
							(-0.30)	
EMPO - EMPO$_{-1}$							0.26	
							(-1.39)	
$EMPO_{-3}$								1.14
								(0.65)
EMPO - EMPO$_{-3}$								0.55
								(-1.16)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	29,646	15,553	29,640	29,549	29,640	29,549	28,415	23,154
Pseudo *R*-squared	0.190	0.263	0.220	0.219	0.221	0.219	0.224	0.252

Table 4
Determinants of defaults for firms with DC plans

This table shows the hazard ratios from the estimation of a Cox proportional hazard model for the default probability of firms with DC plans. The sample period is 1992-2012. Ln(*Sales*) is the natural log of sales. *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. *Firm age* is the number of years since the firm first appears on Compustat. *Return* is the firm's cumulative stock return in the past 12 months. *Insider ownership* is the fraction of shares held by management and directors. $D^{EMPO>0}$ is a dummy equal to 1 if the firm's DC plans have non-zero own stock ownership in the past five years and 0 otherwise. $EMPO^{0\text{-}10\%}$ is the fraction of the firm's shares owned by DC plans if it is lower than or equal to 10% and zero otherwise. $EMPO^{10\%+}$ is the fraction of the firm's shares owned by DC plans if it is more than 10% and zero otherwise. $PEMPO^{0\text{-}10\%}$ is the fraction of the firm's shares owned by DC plans if it is lower than or equal to 10% and 10% otherwise. $PEMPO^{10\%+}$ is (the fraction of the firm's shares owned by DC plans – 10%) if it is more than 10% and 0 otherwise. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Ln(*Sales*)	1.43***	1.29***	1.46***	1.42***	1.42***
	(16.53)	(5.66)	(17.68)	(16.83)	(16.75)
Sales growth	1.00	0.99**	1.00	1.00	1.00
	(-1.50)	(-2.33)	(-0.43)	(-0.40)	(-0.40)
Change in EBITDA/sales	1.00***	1.00**	1.00	1.00	1.00
	(-3.17)	(-2.57)	(-1.45)	(-1.49)	(-1.48)
Leverage	1.03***	1.03***	1.03***	1.03***	1.03***
	(31.66)	(19.77)	(32.48)	(33.25)	(33.28)
Firm age	0.96***	0.97***	0.96***	0.96***	0.96***
	(-7.85)	(-3.77)	(-7.36)	(-7.85)	(-7.87)
Return			0.98***	0.98***	0.98***
			(-11.79)	(-11.81)	(-11.79)
Insider ownership		1.01*			
		(1.67)			
$D^{EMPO>0}$	0.50***	0.65**	0.51***		
	(-7.20)	(-2.51)	(-7.26)		
$EMPO^{0\text{-}10\%}$				0.91***	
				(-2.69)	
$EMPO^{10\%+}$				1.01	
				(0.93)	
$PEMPO^{0\text{-}10\%}$					0.94**
					(-2.15)
$PEMPO^{10\%+}$					1.16**
					(2.28)
Year dummies	Yes	Yes	Yes	Yes	Yes
Obs.	81,108	34,770	81,042	81,042	81,042
Pseudo *R*-squared	0.137	0.190	0.168	0.164	0.163

Table 5
Bankruptcy frequencies and other characteristics

Panel A considers firms filing for bankruptcies with 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 and plan participants on the last reporting date prior to defaults. Panel B considers firms filing for bankruptcies and having DB plans. Panel C considers firms restructuring out of court and having DB plans. For each of the five years before defaults, these panels report 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 fraction of the firm's shares outstanding owned by pension plans if it is non-zero. *EMPO (% of assets)* is the fraction of company stock investment in pension assets if it is non-zero. *Contributions/firm contributions* are the firm's contributions to pension plans in millions. Panel D considers firms filing for bankruptcies and having DC plans. Panel E considers firms restructuring out of court and having DC plans. *Employee contributions* are employees' contributions to pensions in millions.

Panel A: Bankrupt Firm Characteristics

	# Firms	Assets	Sales	Employees	Plan participants
All bankruptcies	545	2558.4	1558.9	7286.8	
Firms with DB plans	248	4173.8	2971.9	10032.5	3470.6
Firms with DC plans	529	2653.5	1570.3	7344.3	3351.3

Panel B: DB Pension Characteristics, firms restructuring in bankruptcy

Year	# of obs.	*UF%*		*UF* > 0	*UF* ($mil) if *UF* > 0		*UF* (%) if *UF* > 0		*% UF* > 10%
		Mean	Median		Mean	Median	Mean	Median	
-5	174	-7.4%	-3.3%	47.1%	46.5	6.8	21.5%	17.5%	33.3%
-4	201	-6.0%	-2.0%	48.3%	50.5	9.2	20.8%	18.9%	32.3%
-3	216	-6.9%	0.0%	49.1%	43.9	5.6	20.6%	16.9%	35.6%
-2	202	1.3%	5.1%	57.9%	60.1	9.0	24.4%	17.9%	45.0%
-1	142	5.1%	9.0%	63.4%	75.7	9.9	22.9%	21.3%	46.5%

Year	# of obs.	% with *EMPO*>0	*EMPO* (% of shr)		*EMPO* (% of assets)		*Contributions* ($mil)
			Mean	Median	Mean	Median	
-5	174	6.9%	1.5%	1.2%	4.0%	3.9%	10.3
-4	201	9.5%	1.0%	0.3%	3.4%	2.8%	7.1
-3	216	5.6%	1.3%	0.5%	3.2%	2.1%	6.7
-2	202	5.9%	1.1%	0.5%	3.7%	3.0%	6.9
-1	142	2.8%	0.5%	0.2%	1.7%	1.0%	6.1

Panel C: DB Pension Characteristics, firms restructuring out of court

Year	# of obs.	*UF%*		*UF* > 0	*UF* ($mil) if *UF* > 0		*UF* (%) if *UF* > 0		*% UF* > 10%
		Mean	Median		Mean	Median	Mean	Median	
-5	34	0.7%	-2.1%	38.2%	93.0	4.8	33.2%	24.0%	32.4%
-4	49	-4.7%	-1.2%	49.0%	20.1	6.6	24.0%	22.2%	44.9%
-3	42	-5.2%	5.1%	57.1%	13.2	5.8	23.3%	19.2%	40.5%
-2	47	-5.4%	4.6%	53.2%	12.0	3.3	23.2%	18.6%	44.7%
-1	43	11.9%	14.1%	69.8%	29.9	9.0	26.2%	26.8%	60.5%

Year	# of obs.	% with *EMPO*>0	*EMPO* (% of shr)		*EMPO* (% of assets)		*Contributions*
			Mean	Median	Mean	Median	($mil)
-5	34	2.9%	3.0%	3.0%	2.1%	2.1%	4.6
-4	49	2.0%	2.2%	2.2%	2.0%	2.0%	5.9
-3	42	2.4%	1.3%	1.3%	2.3%	2.3%	4.2
-2	47	0.0%	N/A	N/A	N/A	N/A	3.7
-1	43	2.3%	3.5%	3.5%	1.9%	1.9%	3.3

Panel D: DC Pension Characteristics, firms restructuring in bankruptcy

Year	# of obs.	% with EMPO > 0	*EMPO* (% of shr)		*EMPO* (% of assets)		Firm contributions ($mil)	Employee contributions ($mil)
			Mean	Median	Mean	Median		
-5	372	31.5%	4.0%	1.8%	26.0%	20.2%	4.4	9.0
-4	418	28.0%	3.2%	1.2%	20.6%	13.3%	3.6	9.4
-3	446	27.1%	3.7%	1.5%	18.9%	12.2%	3.5	8.7
-2	442	27.4%	3.0%	1.6%	12.9%	6.1%	3.2	8.7
-1	347	28.8%	3.9%	1.9%	11.5%	4.6%	3.4	9.1

Panel E: DC Pension Characteristics, firms restructuring out of court

Year	# of obs.	% with EMPO > 0	*EMPO* (% of shr)		*EMPO* (% of assets)		Firm contributions ($mil)	Employee contributions ($mil)
			Mean	Median	Mean	Median		
-5	115	18.3%	2.4%	1.7%	27.2%	20.0%	3.2	8.8
-4	141	17.0%	2.4%	1.5%	21.7%	18.3%	3.5	12.9
-3	150	18.0%	1.9%	1.0%	13.8%	10.7%	4.0	9.1
-2	137	19.0%	2.4%	1.1%	10.7%	7.7%	4.1	9.2
-1	132	21.2%	3.8%	1.2%	8.2%	3.7%	3.5	10.5

Table 6
Distribution of restructuring types

This table presents the number and percentage of defaults by restructuring types for defaults from 1992-2012.

	Chapter 11 (not pre-packed)	Pre-packed Chapter 11	Distressed Exchange	Other out-of-court
All	508	37	96	85
	70.0%	5.1%	13.2%	11.7%
DB plans	230	18	46	24
	72.3%	5.7%	14.5%	7.6%
DC plans	492	37	94	82
	69.8%	5.3%	13.3%	11.6%
DB plans only	16	0	2	3
	76.2%	0.0%	9.5%	14.3%
DC plans only	278	19	50	61
	68.1%	4.7%	12.3%	15.0%
Both DB & DC	214	18	44	21
	72.1%	6.1%	14.8%	7.1%

Table 7

Determinants of filing for bankruptcy after default for firms with DB plans

This table shows the marginal effects from the estimation of a logit model for the probability of firms with DB plans filing for bankruptcy after default. The sample period is 1992-2012. Ln(*Sales*) is the natural log transformation of sales. *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. *Firm age* is the number of years since the firm first appears on Compustat. *Return* is the firm's cumulative stock return in the past 12 months. *Insider ownership* is the fraction of shares held by management and directors. 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. *EMPO* is the fraction of the firm's shares owned by DB plans. $D^{EMPO>0}$ is a dummy equal to 1 if the firm's DB plans have non-zero own stock ownership in the past year and 0 otherwise. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

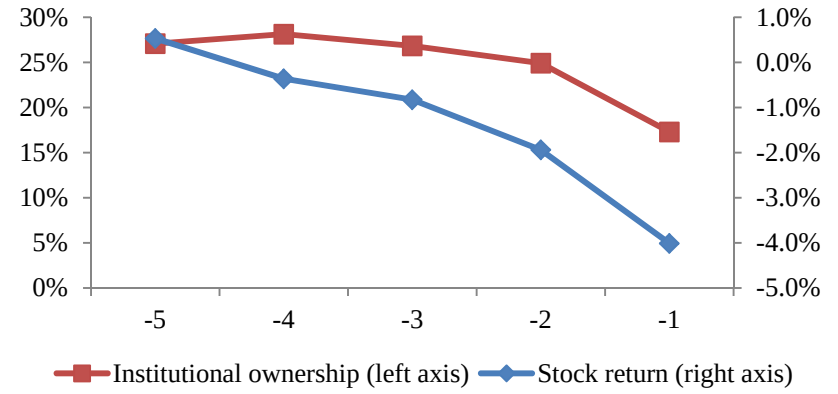
	(1)	(2)	(3)	(4)	(5)
	Bankruptcy = 1	*Bankruptcy = 1*	*Bankruptcy = 1*	*Bankruptcy = 1*	*Bankruptcy = 1*
Ln(*Sales*)	0.03	0.03	0.04	0.03	0.03
	(1.24)	(1.37)	(0.96)	(1.39)	(1.38)
Sales growth	-0.00	0.00	0.00	0.00	0.00
	(-0.02)	(0.30)	(0.65)	(0.30)	(0.33)
Change in EBITDA/sales	-0.00	-0.00	-0.00	-0.00	-0.00
	(-1.44)	(-1.53)	(-1.15)	(-1.51)	(-1.50)
Leverage	0.00	0.00*	0.00**	0.00*	0.00**
	(1.58)	(1.94)	(2.21)	(1.95)	(1.98)
Firm age	0.00	0.00	-0.00	0.00	0.00
	(0.94)	(0.93)	(-0.90)	(0.95)	(0.91)
Return		-0.00***	-0.00	-0.00***	-0.00***
		(-3.20)	(-0.91)	(-3.23)	(-3.22)
Insider ownership			-0.00		
			(-0.40)		
D_{uf}	0.01	0.01	0.09		0.02
	(0.19)	(0.24)	(0.80)		(0.39)
D^{10}_{uf}				0.02	
				(0.30)	
EMPO	-0.01	-0.01	-0.22	-0.02	
	(-0.14)	(-0.14)	(-1.62)	(-0.15)	
$D^{EMPO>0}$					0.08
					(0.66)
Year dummies	Yes	Yes	Yes	Yes	Yes
Obs.	272	271	94	271	271
Pseudo R-squared	0.114	0.144	0.214	0.144	0.146

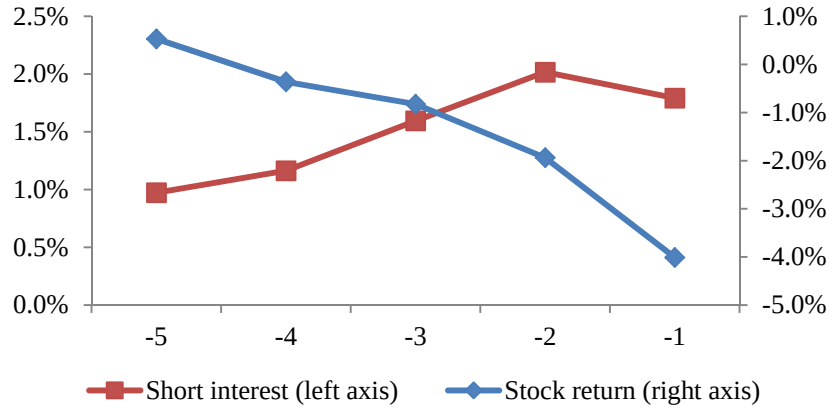
Table 8

Determinants of filing for bankruptcy after default for firms with DC plans

This table shows the marginal effects from the estimation of a logit model for the probability of firms with DC plans filing for bankruptcy after default. The sample period is 1992-2012. Ln(*Sales*) is the natural log transformation of sales. *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. *Firm age* is the number of years since the firm first appears on Compustat. *Return* is the firm's cumulative stock return in the past 12 months. *Insider ownership* is the fraction of shares held by management and directors. $D^{EMPO>0}$ is a dummy equal to 1 if the firm's DC plans have non-zero own stock ownership in the past year and 0 otherwise. *EMPO* is the fraction of the firm's shares owned by DC plans. *Change in EMPO* is the change in *EMPO* in the past one year. $EMPO^{0\text{-}10\%}$ is the fraction of the firm's shares owned by DC plans if it is lower than or equal to 10% and zero otherwise. $EMPO^{10\%+}$ is the fraction of the firm's shares owned by DC plans if it is more than 10% and zero otherwise. $PEMPO^{0\text{-}10\%}$ is the fraction of the firm's shares owned by DC plans if it is lower than or equal to 10% and 10% otherwise. $PEMPO^{10\%+}$ is (the fraction of the firm's shares owned by DC plans – 10%) if it is more than 10% and 0 otherwise. Numbers in parentheses are z-statistics. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Bankruptcy=1	*Bankruptcy=1*	*Bankruptcy=1*	*Bankruptcy=1*	*Bankruptcy=1*	*Bankruptcy=1*
Ln(*Sales*)	0.02	0.02	-0.02	-0.01	0.02	0.02
	(1.20)	(1.15)	(-0.69)	(-0.30)	(1.22)	(1.27)
Sales growth	0.00	0.00	0.00	0.00	0.00	0.00
	(1.10)	(1.09)	(0.98)	(1.15)	(0.57)	(0.55)
Change in EBITDA/sales	-0.00	-0.00	-0.00**	-0.00**	-0.00	-0.00
	(-0.43)	(-0.44)	(-2.25)	(-2.07)	(-0.46)	(-0.47)
Leverage	0.00	0.00*	0.00***	0.00**	0.00**	0.00**
	(1.63)	(1.64)	(2.52)	(2.29)	(1.98)	(1.95)
Firm age	0.00	0.00*	0.00	0.00	0.00*	0.00*
	(1.64)	(1.66)	(0.09)	(0.19)	(1.76)	(1.80)
Return		-0.00	0.00	-0.00	-0.00	-0.00
		(-0.80)	(0.59)	(-0.30)	(-1.18)	(-1.25)
Insider ownership			-0.00*	-0.00*		
			(-1.85)	(-1.81)		
$D^{EMPO>0}$	0.10**	0.10**	0.10*			
	(2.43)	(2.28)	(1.71)			
EMPO				0.03*		
				(1.67)		
Change in EMPO				-0.07**	-0.05**	-0.05**
				(-2.30)	(-2.57)	(-2.30)
$EMPO^{0\text{-}10\%}$					0.05**	
					(2.22)	
$EMPO^{10\%+}$					0.02*	
					(1.72)	
$PEMPO^{0\text{-}10\%}$						0.03**
						(1.98)
$PEMPO^{10\%+}$						-0.00
						(-0.12)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	679	678	206	199	636	636
Pseudo R-squared	0.074	0.075	0.184	0.189	0.082	0.080





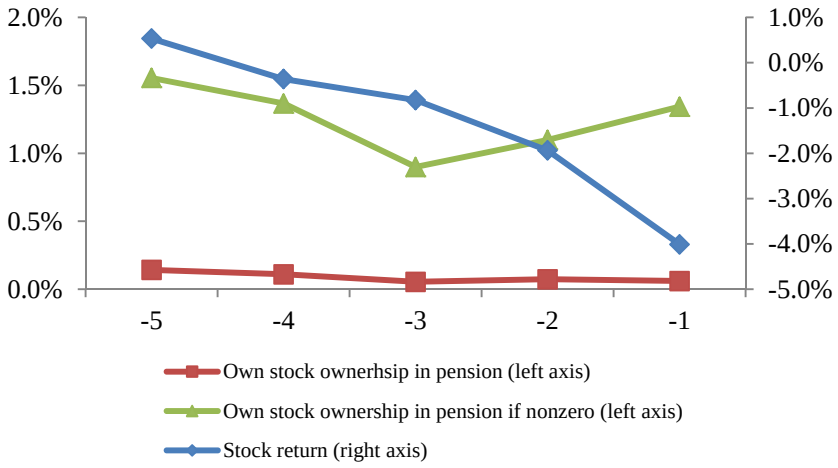


Figure 1

Institutional ownership, short interest, and own stock ownership in DB plans before default

This figure presents the average institutional ownership, short interest, and own stock ownership in DB plans in each of the five years prior to firms' defaults. Stock return is the average monthly return. Institutional ownership is the number of shares held by institutional investors in the CDA/Spectrum 13F database divided by the number of shares outstanding. Short interest is the average monthly short interest (number of shares shorted/number of shares outstanding). Own stock ownership is the numbers of shares held in DB plans divided by the number of shares outstanding.

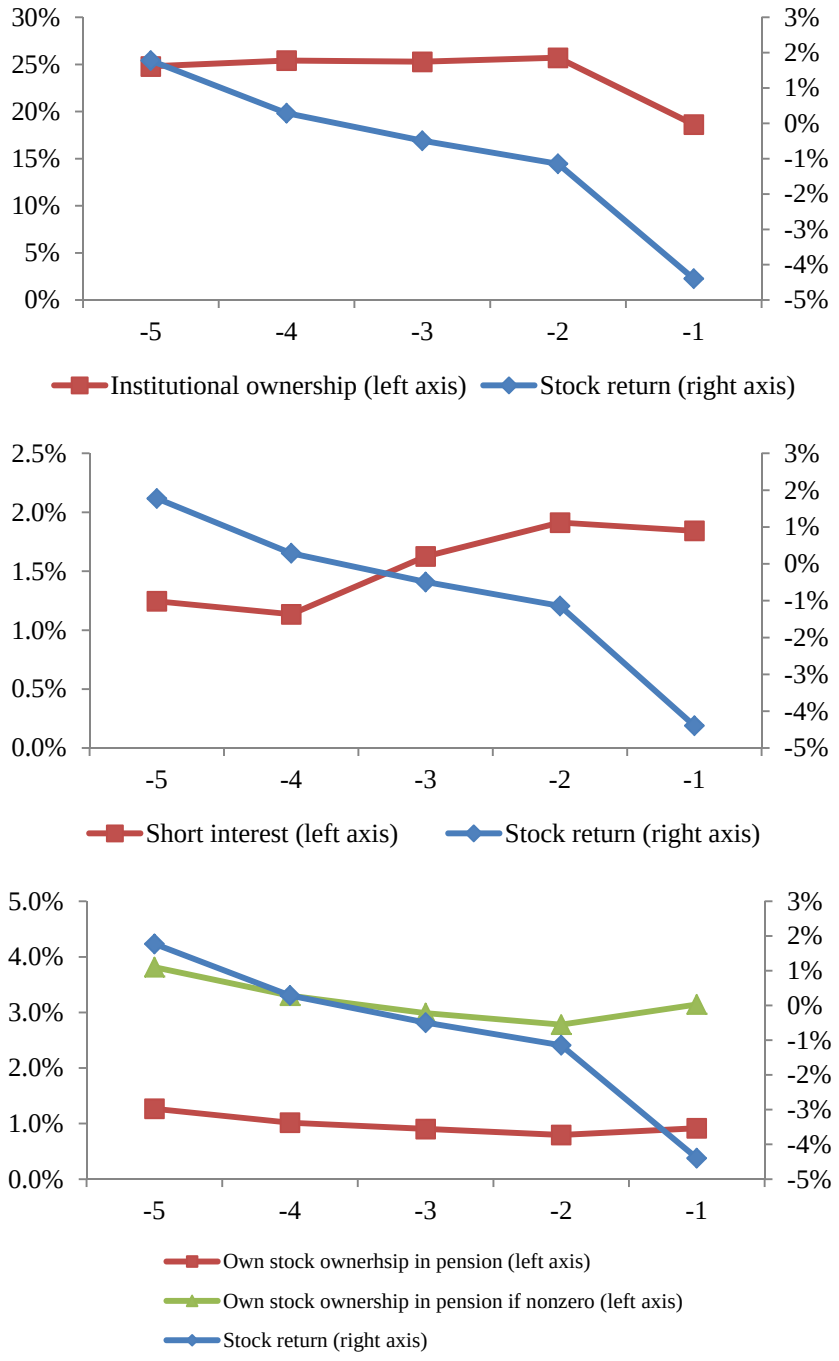


Figure 2

Institutional ownership, short interest, and own stock ownership in DC plans before default

This figure presents the average institutional ownership, short interest, and own stock ownership in DC plans in each of the five years prior to firms' defaults. Stock return is the average monthly return. Institutional ownership is the number of shares held by institutional investors in the CDA/Spectrum 13F database divided by the number of shares outstanding. Short interest is the average monthly short interest (number of shares shorted/number of shares outstanding). Own stock ownership is the numbers of shares held in DC plans divided by the number of shares outstanding.