Essays on Corporate Defined Benefit Pension Plans and Chapter 11 Bankruptcy

by

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Abstract

In this thesis, I present two essays on corporate defined benefit pension claimants and Chapter 11 bankruptcy. First, defined benefit claimants are related to a lower likelihood that the firm files for Chapter 11 bankruptcy. Second, defined benefit claimants influence the bankruptcy reorganization process beyond the role played by the firm's traditional creditors.

In the first essay, I examine the role of defined benefit claimants in times leading up to bankruptcy. Defined benefit claimants are less diversified and face higher costs of Chapter 11 bankruptcy than traditional lenders. I show that these differences have implications for the likelihood that firms file for Chapter 11 bankruptcy: the higher the share of defined benefit liabilities relative to overall liabilities, the lower the likelihood of Chapter 11 bankruptcy. These results indicate that defined benefit claimants' incentives to keep the firm as a going concern matter for the firm's decision to file for Chapter 11 and should be considered in studies of debt renegotiation between the firm and its creditors.

In the second essay, I focus on defined benefit claimants in bankruptcy and their impact on the reorganization process. I provide evidence that pension claimants influence the Chapter 11 restructuring beyond the impact of traditional lenders. In particular, defined benefit claimants play a role in the decision to terminate a pension plan in bankruptcy, in the likelihood that firms refile for bankruptcy, and in the amounts that unsecured creditors recover in bankruptcy. These results highlight a role for pension claimants in bankruptcy restructuring beyond that of traditional creditors. Additional tests indicate that one channel through which defined benefit claimants influence the Chapter 11 process and its outcomes is by accepting cuts in their pension liabilities which cannot be explained by the average reductions experienced by other creditors. These findings highlight the role of defined benefit claimants as an important player in bankruptcy restructuring.

Preface

This dissertation is original, unpublished, independent work by the author, Milka Dimitrova.

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Milka Dimitrova
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Dedication

To my family.

Chapter 1

Introduction

Corporate defined benefit pension obligations are sizable firm liabilities in the economy[1]. In 2013, U.S. corporations held $5 trillion in aggregate defined benefit liabilities and $18 trillion in financial liabilities[2]. The large amount and relative size of pension liabilities is not a recent phenomenon: Corporate defined benefit obligations have consistently represented close to a third of financial liabilities over the past 20 years[3]. Despite pension claimants' sizable liabilities, little is known about defined benefit claimants and their role as firm creditors.

While defined benefit liabilities are off-balance sheet obligations, the finance literature has long recognized that these pension obligations resemble firms' balance sheet liabilities. Defined benefit pension obligations are similar to firms' other liabilities along several dimensions. First, firms are liable for the pension benefits they promise, just like for other corporate liabilities. Like other creditors, defined benefit claimants are promised a fixed payout regardless of the financial performance of the assets that are set aside to meet the pension promises. Firms must regularly contribute to the defined benefit plan to cover the pension promise and

[1] In general, there are two types of corporate pension obligations: defined benefit and defined contribution liabilities. In a defined benefit plan, the firm promises to pay participants a certain level of retirement income, which is often based on employees' years of service, age, and salary. Such plans may distribute benefits in the form of a life annuity payable at a specified retirement age. In a defined contribution plan, the firm does not guarantee a particular level of income upon retirement. Instead, the employer and employer make certain contributions to an individualized account during the course of the worker's employment. The focus of this thesis is on corporate defined benefit pension plans.

[2] Note that in this dissertation, the term "defined benefit liability" is not limited to the accounting definition of the pension liability but instead refers to the entire projected benefit obligation reported in the footnotes to firms' financial statements. Therefore, the terms "defined benefit liability" and "defined benefit obligation" are used interchangeably.

[3] I will use the terms "defined benefit" and "pension" as synonymous hereafter.

these contributions resemble bond interest (and principal) payments. Like interest payments, pension contributions are tax deductible at the corporate level. In addition, failure to contribute to the pension plan can trigger bankruptcy, just like missing interest payments would. In default, pension liabilities can be senior or at par with unsecured financial liabilities, and they are never junior to financial debt. Overall, the defined benefit pension commitment is similar to a firm's legal promise to pay off conventional debt on its balance sheet.

However, defined benefit pension liabilities may not be perfect substitutes for traditional debt. For example, the existence of government guarantees by the Pension Benefit Guarantee Corporation sets aside defined benefit obligations from other firm liabilities. As a result, pension obligations may encourage risk-taking behavior since the firm may not bear the full costs of imposing high risk on defined benefit claimants. In addition, the off-balance sheet treatment and reporting discretion of pension liabilities differentiate them from traditional debt obligations. Even further, defined benefit claimants are less diversified than traditional lenders. Banks or hedge funds, for instance, have well diversified portfolios and one firm's bankruptcy would rarely have a sizable effect on their wealth. Defined benefit claimants, on the other hand, have their pension wealth invested in their employer and the firm's bankruptcy would have sizable wealth effects for pension lenders. Altogether, defined benefit obligations differ from traditional liabilities along various dimensions.

In this thesis, I exploit the wedge between defined benefit obligations and other firm liabilities to study how pension claimants influence firm decisions. I use Chapter 11 bankruptcy as a testing laboratory for my experiments. Chapter 11 is the ideal setting to investigate the role of defined benefit claimants because bankruptcy is the only time when defined benefit plans can be terminated. As a result, Chapter 11 is particularly costly for pension beneficiaries. Although defined benefit claimants may have to make concessions even in private negotiations, they bear the additional risk of having their plan terminated in Chapter 11. Pension plan termination may lead to losses of pension benefits and future pension coverage, thus making Chapter 11 the costliest form of reorganization for defined benefit claimants. Traditional lenders do not face such a loss in bankruptcy. Due to the higher costs associated with Chapter 11 bankruptcy relative to other forms of reor-

ganization, defined benefit claimants' role will be most pronounced prior to and in bankruptcy.

To capture the role of pension claimants in bankruptcy, I control for firms' overall indebtedness and measure pension claimants' influence relative to that of other creditors. I account for all firm obligations by adding together firms' total balance sheet liabilities and two of the largest off-balance sheet obligations, defined benefit liabilities and operating leases. Since all liabilities become important in bankruptcy (Denis and Rodgers, 2007), I control for the role of the firm's overall indebtedness and I capture any additional effect that defined benefit claimants may have by using the ratio of defined benefit liabilities to all firm liabilities. This ratio captures pension claimants' influence relative to that of the firm's other creditors. By controlling for firms' overall indebtedness and focusing on the composition of firm lenders, I am able to investigate the incremental impact that defined benefit claimants have beyond other lenders on the Chapter 11 reorganization process and its outcomes.

Using these measures, I explore the impact of defined benefit claimants on the likelihood of Chapter 11 bankruptcy and on the outcomes of bankruptcy restructuring. In Chapter 2, I investigate whether defined benefit claimants are related to the likelihood that firms file for bankruptcy. Due to their lack of diversification and the option to have their pension plan terminated, defined benefit claimants have a higher incentive than traditional lenders to avoid Chapter 11 by negotiating with the firm privately. In line with this prediction, I find that defined benefit claimants are associated with a lower likelihood of bankruptcy: firms are less likely to file for Chapter 11 whenever more of their liabilities are comprised of defined benefit obligations. The effect is economically significant: a one standard deviation increase in the contribution of defined benefit liabilities to overall liabilities is associated with a 6% decrease in the likelihood of bankruptcy with respect to the sample average. These results extend to different specifications and alternative measures of the pension liabilities. My findings confirm that defined benefit claimants are more likely to agree to concessions to keep the firm out of Chapter 11 than traditional creditors. Altogether, I provide evidence for a role of defined benefit claimants in times leading up to bankruptcy.

Since defined benefit claimants matter prior to bankruptcy, in Chapter 3 I also

consider if pension claimants influence the bankruptcy restructuring process. The similarities and differences between defined benefit claimants and other lenders may lead pension claimants to exert an influence beyond that of traditional lenders in bankruptcy. In support of this idea, I provide evidence that defined benefit claimants matter for certain features of the reorganization process. In particular, I show that firms with more pension obligations relative to overall liabilities are more likely to terminate a pension plan in bankruptcy. This result supports the first essay's argument that the expectation of plan terminations in bankruptcy provides an incentive for defined benefit claimants to avoid Chapter 11. I also document that pension claimants are associated with a lower likelihood that firms refile for Chapter 11 post-reorganization. This finding is consistent with the first essay's results that defined benefit claimants are less likely to file for bankruptcy. In addition, I find some indication that pension claimants are associated with higher recovery rates for unsecured creditors upon bankruptcy emergence. In light of the collective evidence that defined benefit claimants may play a role in bankruptcy above and beyond the influence of traditional lenders, I try to identify the channels through which pension claimants influence the reorganization process. I focus on benefit concessions that pension claimants may agree to as one action that these claimants may undertake to impact bankruptcy restructuring. I find that the reductions that pension claimants agree to are largely determined by pension claimants with higher unfunded liabilities relative to overall liabilities. My results indicate that defined benefit claimants take deliberate actions to impact the bankruptcy restructuring process beyond the influence of traditional firm lenders in Chapter 11.

In the literature, Ippolito (1985a) is one of the first authors to identify corporate defined benefit claimants as firm bondholders. In his model of pension liabilities, Ippolito (1985a) shows that corporate pensions represent an implicit contract between the firm and its employees because the firm promises workers a stable level of income upon retirement in exchange for lower upfront compensation. This implicit contract gives pension claimants strong incentives to remain with the firm and to save in the firm by contributing more heavily to the pension[4]. By underfunding its defined benefit pension plan, the firm makes its employees long-term

[4]Workers contribute to defined benefit plans by accepting lower wages upfront and higher pensions in the future.

bondholders in the firm. Thus, apart from their human capital investment, pension claimants have a direct financial stake in the firm in the form of an unsecured long-term bond. Ippolito (1985a) questions the optimality of turning employees into bondholders given that firm employees are less diversified than traditional lenders and do not have the level of sophistication of outside creditors. In a separate study, Ippolito (1985b) concludes that such a strategy may be optimal for firms that want to avoid a potential hold-up problem created by powerful unions.

As unsecured firm lenders, defined benefit claimants may influence various firm decisions, such as firms' capital structure choice, for example. Arnott and Gersovitz (1980) develop one of the first models that integrates corporate financial structure and defined benefit liabilities. Corporate pensions are modeled as an instrument which allows firms to simultaneously defer compensation and influence risk-sharing between capital and labor. Arnott and Gersovitz (1980) show that when firms cannot diversify risk completely, financial structure and employment contracts are determined simultaneously and are therefore interdependent. Shivdasani and Stefanescu (2010) provide empirical evidence in support of the view that firms make capital structure decisions with defined benefit pension liabilities in mind. In particular, they find that a 1 percentage point increase in the pension liability to total assets ratio is associated with a 0.36 percentage points decrease in the leverage ratio. Shivdasani and Stefanescu (2010) conclude that firms consider pension assets and liabilities in determining their leverage ratios and managers partially substitute pension-related deductions for interest deductions in capital structure decisions.

Apart from capital structure choice, the literature has also considered how defined benefit liabilities impact various other firm decisions. Rauh (2006) documents that defined benefit pensions impact corporate investment. In particular, the author finds that pension sponsors decrease spending on capital expenditures when internal resources are reduced due to required pension contributions. Chang, Kang, and Zhang (2011) investigate the role of defined benefit claimants in firms' investment decisions as measured by mergers and acquisitions. The authors argue that pension deficits serve as a control mechanism that limits managers' discretionary power and find that companies with unfunded pension liabilities are less likely to undertake diversifying mergers, they experience higher merger announcement re-

turns, pay lower premiums for targets, and use more cash as a method of payment. Cocco and Volpin (2012) study the role of pension liabilities from the perspective of target firms in mergers and acquisitions. They show that defined benefit pension sponsors in the United Kingdom are less likely to be acquisition targets and if targeted, the deal is less likely to be completed. As a result, corporate defined benefit pension obligations are found to serve as a takeover deterrent.

Lin, Liu, and Yu (2014) examine the role of pension liabilities in determining firms' debt maturity structure. The authors argue that defined benefit obligations increase agency costs because the uncertainty in their valuation increases firm riskiness to the benefit of shareholders. Lin et al. (2014) examine if firms use short-maturity corporate debt to mitigate these agency costs and show that there is a positive relationship between short-term debt levels and pension obligations.

As unsecured firm creditors, defined benefit claimants influence firm decisions and may be relevant for firms in default. A substantial literature examines bankruptcy and the renegotiation of creditors' claims. Bulow and Shoven (1978) develop a model of the likelihood of bankruptcy which focuses on the conflicts of interest among three classes of claimants: bank lenders, bond holders, and stockholders. In addition, James (1995) models the conditions under which bank lenders agree to concessions. The author shows that banks are less willing to scale down their claims in exchange for an equity position if they are not the only firm lender.

Beyond negotiations with bank lenders in bankruptcy, the literature has investigated the role of other firm lenders in Chapter 11 reorganization. For example, Hotchkiss and Mooradian (1997) consider vulture investors in financially distressed companies. The authors find that when vulture investors get involved in bankrupt companies, they purchase a significant amount of debt claims to influence the terms of the restructuring and become active on boards and in management of the target companies. In addition, Hotchkiss, Smith, and Strömberg (2012) document a role for private equity investors in bankruptcy. In default, firms backed with private equity financing are more likely to restructure their debt claims in private negotiations, they restructure faster and are more likely to emerge as an independent company following default. Last, Jiang, Li, and Wang (2012) provide evidence that hedge funds bring about efficiency gains in Chapter 11 bankruptcy. The authors show that hedge funds choose strategic positions in distressed compa-

nies to have the strongest impact on the reorganization process. In addition, hedge funds are related to a higher likelihood that firms emerge from bankruptcy and that unsecured creditors recover a higher portion of their claims. Overall, previous studies have documented the importance of alternative firm lenders in bankruptcy proceedings.

The current thesis makes several specific contributions to the literature. The first essay contributes in two fronts. First, to the best of my knowledge, my study is the first empirical work to explicitly consider the role of defined benefit pension claimants as firm lenders. I control for the overall financial position of the firm and I measure the role of defined benefit claimants as the relative contribution of their liability to the overall firm obligations. Thus, I am able to focus on the composition of firm creditors and to study one specific firm lender, defined benefit claimants, whose bargaining incentives in distress differ from those of traditional lenders. Second, I provide evidence that defined benefit claimants influence an important firm choice: the decision to file for bankruptcy. I find that pension claimants are related to a lower probability that firms file for Chapter 11. Therefore, my results highlight the need to account for defined benefit claimants in studies of bankruptcy prediction.

The second essay contributes by showing that defined benefit claimants influence the bankruptcy reorganization process above and beyond the impact of traditional lenders. My results indicate a role for pension claimants in plan terminations in bankruptcy and relate defined benefit claimants to lower probabilities of subsequent bankruptcy and higher recovery rates for unsecured creditors. These results further reinforce the first study's findings. Moreover, I document that defined benefit claimants' willingness to accept concessions represents one channel through which pension claimants can influence reorganization. I find that reductions in defined benefit obligations are determined mostly by the unfunded portion of pension liabilities relative to other liabilities, after controlling for the expected losses for all creditors in bankruptcy. Therefore, the second essay provides insights about the specific actions undertaken by defined benefit claimants in bankruptcy reorganization.

Chapter 2

Corporate Defined Benefit Pension Plans and Chapter 11 Bankruptcy

2.1 Introduction

Corporate defined benefit pension obligations are sizable firm liabilities. As Figure 2.1 shows, in 2012 Compustat pension sponsors owed close to $5 trillion in defined benefit liabilities, compared to $16 trillion in financial liabilities. The firm owes these pension liabilities to its employees, the defined benefit pension claimants. While similar to traditional lenders, defined benefit claimants differ from the firm's other creditors in the higher costs of bankruptcy that they face. In Chapter 11, defined benefit claimants stand to lose some of the benefits earned to date[5] and possibly all future benefits if the plan is terminated[6], along with any future salary losses they may incur. Despite their sizable liabilities and the high costs of bankruptcy, defined benefit claimants and their role in times leading to bankruptcy have re-

[5]According to the Employee Retirement Income Security Act of 1974 (ERISA), retirees' pension income is partly guaranteed by a government entity, the Pension Benefit Guarantee Corporation (PBGC). In 2014, the maximum benefit guaranteed by the PBGC for a 65-year-old retiree is about $4,940 per month. For employees who are younger or have fewer years of service, the amount guaranteed by the PBGC is lower. Therefore, if their defined benefit plan is terminated in bankruptcy and transferred to the PBGC, employees whose pensions exceed the amount guaranteed by the PBGC or who do not meet the age requirement will receive an amount equal to the greater of the minimum PBGC guarantee and the amount funded by assets. Therefore, these employees will lose some unfunded benefits: the difference between what they were promised and the higher of the PBGC guarantee or the funded amounts, whichever is higher.

[6]Under ERISA, fully funded and overfunded defined benefit pension plans may be terminated at any time, but underfunded defined benefit pension plans can only be terminated in Chapter 11 bankruptcy.

mained largely unexplored[7].

In this paper, I study defined benefit obligations in the context of Chapter 11 bankruptcy. My conceptual framework is based on the idea that defined benefit claimants are less diversified than traditional lenders because these claimants' human capital and pension wealth are invested in the firm. As a result, defined benefit claimants are more averse than traditional creditors to bad states of the world such as bankruptcy. Bankruptcy is the perfect setting to study defined benefit claimants since the option to terminate pension plans in Chapter 11 makes bankruptcy a costlier form of reorganization than other types of default for pension claimants. Therefore, defined benefit claimants' role will be most pronounced prior to and in bankruptcy. Due to their aversion to bad states, defined benefit claimants have the incentive to avoid Chapter 11 by negotiating with the firm privately. In line with this prediction, I find that defined benefit claimants are associated with a lower likelihood of Chapter 11 bankruptcy.

I study the role of defined benefit claimants in a sample of 481 defined benefit pension sponsors from 1987 to 2012, with 244 bankrupt sponsors matched to non-bankrupt sponsors by industry, year, and size. I test whether conditional on the firm's overall indebtedness, the contribution of defined benefit liabilities to overall liabilities impacts the likelihood of bankruptcy. To best capture firms' overall indebtedness, I account for all of the firms' balance sheet liabilities and two of the largest off-balance sheet obligations, defined benefit obligations and operating leases. I find that firms are less likely to file for bankruptcy when more of their overall liabilities are comprised of defined benefit liabilities. The effect is economically significant: a one standard deviation increase in the contribution of defined benefit liabilities to overall liabilities is associated with a 6% decrease in the likelihood of bankruptcy with respect to the sample average. These results suggest that defined benefit claimants are more likely to make concessions in order to keep the firm out of Chapter 11 than traditional creditors.

While these findings indicate a role for defined benefit obligations in Chapter

[7]Beyond the pension losses incurred in bankruptcy, defined benefit claimants stand to lose their jobs, their future salaries, health insurance, and any benefits they earned through seniority, among others. As Ippolito (1985a, 2004) notes, if employees are paid above the competitive level to remain in the firm, a bankruptcy filing may lead to substantial losses for the firm's employees.

11, they apply to a subsample of defined benefit sponsors. To determine whether the results can be extended to all public firms, I re-estimate the main tests in the Compustat universe of all public firms from 1987 to 2012 which meet the original sampling criteria. I find that defined benefit sponsors are less likely to file for bankruptcy than firms without a defined benefit plan. Moreover, I find that the higher the contribution of defined benefit liabilities to overall liabilities, the lower the likelihood of bankruptcy: a one standard deviation increase in the ratio of defined benefit obligations to overall liabilities is associated with a 1% decrease in the likelihood of bankruptcy. Overall, these findings confirm that the results presented in the main sample extend to the Compustat universe as well.

In the main tests, I proxy for defined benefit claimants' role in bankruptcy by considering the entire pension liability and not just the part of the liability that is not covered by pension assets. Since defined benefit liabilities which are not covered by assets may give pension claimants higher incentives to influence the bankruptcy decision, I re-estimate the main tests in a subsample of firms with underfunded defined benefit plans. Once again, I find that a higher contribution of defined benefit liabilities to overall liabilities is associated with a lower likelihood of bankruptcy, but the effect is not as statistically significant as in the main sample. Such a result is consistent with the idea that the pension plan's funding status represents only a snapshot of defined benefit claims in a given year and ignores future promises that are important for pension claimants and influence their actions. Thus, using only the plan's funding level may mask the role of defined benefit claimants in bankruptcy.

As another robustness test, I consider an alternative measure of defined benefit obligations to the one used in the main specification. Throughout the paper, I measure pension liabilities as the pension benefit obligation (PBO) which equals the present value of benefits earned to date, assuming that the plan continues in the future and employees' salaries increase. In bankruptcy, firms are only liable for the amount of benefits employees already earned and not for future benefits, so a measure capturing only earned benefits may be more relevant from the firm's perspective. Therefore, I repeat the main tests with defined benefit liabilities measured as just the benefits earned by employees to date assuming that the plan is discontinued (the adjusted benefit obligation, ABO). I confirm that my results hold

under this alternative definition of pension obligations[8].

My paper contributes to the literature on the role of defined benefit liabilities in corporate decisions. Prior work has documented that defined benefit obligations influence firms' capital structure decisions (Shivdasani and Stefanescu, 2010), capital expenditures (Rauh, 2006), debt maturity (Lin et al., 2014), and mergers and acquisitions (Chang et al., 2011; Cocco and Volpin, 2012)[9]. I contribute to the literature by showing that defined benefit claimants influence the decision to file for bankruptcy, another important corporate decision. I provide evidence that defined benefit claimants are associated with a lower likelihood of bankruptcy. My results indicate that defined benefit claimants' strong incentives to keep the firm alive matter for the firm's decision to file for Chapter 11.

Moreover, this essay is related to the literature on bankruptcy and the renegotiation of creditors' claims in default. In a study of bargaining in distress, James (1995) shows that banks are less willing to renegotiate the debt contract if they are not the only firm lender. These results are reinforced by Colla, Ippolito, and Li (2013) who examine debt specialization and show that borrowing from multiple lenders increases bankruptcy costs. In terms of accounting for alternative firm lenders, prior studies have investigated the role of vulture investors in distress (Hotchkiss and Mooradian, 1997), private equity firms in default (Hotchkiss et al., 2012), and hedge funds in Chapter 11 (Jiang et al., 2012). My study contributes to the literature by considering the role of a set of claimants whose incentives to avoid bankruptcy and to keep the firm alive differ from those of the firm's other lenders. My findings show that defined benefit obligations provide explanatory power beyond measures typically used in the literature to explain firms' choice to file for bankruptcy. Hence, accounting for defined benefit claimants is relevant when studying the renegotiation of firms' claims in default.

My paper is also closely related to the work of Benmelech, Bergman, and En-

[8]Note that the PBO differs from the alternative measure, the ABO, only for plans which are still active and have not already been frozen. For frozen plans, the PBO will be approximately equal to the ABO (Begley, Chamberlain, Yang, and Zhang, 2015).

[9]Even further, prior studies have shown that defined benefit obligations are reflected in firms' market valuation (Franzoni and Marin, 2006), equity beta (Jin, Merton, and Bodie, 2006), debt rating (Carroll and Niehaus, 1998), and the pension funds' asset allocation (Rauh, 2009). These studies reinforce the importance of accounting for pension obligations in corporate finance studies.

riquez (2012) and Duan, Hotchkiss, and Jiao (2013). Benmelech et al. (2012) study the role of defined benefit plans' funding status and the threat of plan termination in bankrupt airline companies when management bargains with labor. Duan et al. (2013) study defined benefit and defined contribution plans in distress. The authors document that defined benefit sponsors underfund their plans and reduce the amounts of own stock in the plans prior to debt default and that these actions are associated with a higher probability of debt default. My paper is related to these studies as it shows that the composition of the firm's creditors matters and accounting for defined benefit lenders is crucial in studies of bankruptcy and renegotiation.

The rest of the paper proceeds as follows. Section 2.2 discusses the role of defined benefit claimants prior to bankruptcy and develops the hypotheses under study. Section 2.3 describes the data and presents summary statistics. Section 2.4 outlines the results for the main sample used in this study. Section 2.5 considers an alternative sample and Section 2.6 presents several robustness tests. Finally, Section 2.7 concludes.

2.2 Defined Benefit Claimants Prior to Bankruptcy

Defined benefit obligations represent firm liabilities which are largely not recorded on the balance sheet but appear in the footnotes to firms' financial statements[10]. Despite defined benefit claims being off-balance sheet obligations, the finance literature has long recognized that pension liabilities resemble firms' balance sheet liabilities (Treynor, 1977). Ippolito (1985b) is one of the first papers to explicitly model workers as long-term bondholders of the firm. Through the deferred pension compensation that employees accept, Ippolito (1985b) shows that labor holds a direct financial stake in the firm which is equivalent to an unsecured

[10]Depending on the time period and the specific accounting rules effective at the time, some defined benefit pension variables, such as the pension expense, prepaid/accrued pension cost, or the plan funding status, among others, are reported on firms' financial statements. However, the total amount of defined benefit obligations, the PBO, is only reported in the footnotes to financial statements. For a more detailed discussion on the different reporting requirements over time, refer to Appendix A at the end of the thesis.

long-term bond[11].

While unreported on the balance sheet, defined benefit pension obligations resemble firms' other liabilities in various ways[12]. For example, defined benefit liabilities are similar to debt obligations because workers are promised a fixed payout regardless of the financial performance of the assets that are set aside to meet these promises (Shivdasani and Stefanescu, 2010). Firms are liable for the pension benefits they promise, just like for other corporate liabilities. Defined benefit pension sponsors must regularly contribute to the plan to cover pension obligations and these contributions resemble bond interest (and principal) payments. Like interest payments, failure to meet minimum pension contributions can trigger bankruptcy[13]. In default, pension liabilities can be senior or at par with unsecured financial liabilities and they are never junior to financial debt. Overall, the defined benefit pension commitment is similar to a firm's legal promise to pay off conventional debt on its balance sheet.

At the same time, defined benefit claimants differ from traditional lenders along various dimensions. Of particular interest in this paper are two specific differences: the lack of diversification and the high costs of bankruptcy that distinguish defined benefit claimants from traditional lenders (Ippolito, 2004). Traditional creditors, such as banks, have well diversified portfolios and one firm's bankruptcy rarely has a sizable effect on their wealth. Defined benefit claimants, on the other hand, have their human capital and pension wealth invested in their employer. Therefore, defined benefit claimants are more averse to bad states of the world and thus have larger incentives to avoid them than traditional lenders. While there are many definitions of bad states of the world, such as bond downgrades, covenant violations and debt default, among others, Chapter 11 is the ideal setting to test whether defined benefit claimants act differently from other creditors because bankruptcy is

[11] For a detailed description of labor's legal rights in bankruptcy, refer to Appendix B at the end of the thesis.

[12] Appendix C presents a more in-depth discussion of the similarities and differences between defined benefit claimants and the firm's other lenders than the discussion in the text.

[13] A notable example is the case of LTV Corp which was forced into bankruptcy by the PBGC in 1987. When ERISA was enacted, LTV's pension plan was seriously underfunded and the company stopped contributing to its pension fund. As the size of the unfunded pension obligations grew, the PBGC increased its monitoring efforts. Finally, in 1987 the PBGC forced LTV in bankruptcy and took over its defined benefit pension plan.

the costliest form of reorganization for pension claimants. Although defined benefit claimants may have to make concessions even in private renegotiations, they bear the additional risk that in Chapter 11, their pension plans can be terminated and they may lose their jobs. Upon a distressed plan termination, pension claimants stand to lose all pension benefits that exceed the minimum government guarantee and are not covered by pension assets. These losses could be substantial for defined benefit claimants (Ippolito, 2004). In addition, the promised pension amount is a function of employees' years of service, salary levels and mortality rates, among others. If employees have to switch between employers, both the years of service and salary amounts used to calculate the pension obligation will be lower at the new employer compared to the existing one. Thus, the pension amount employees will receive will be reduced if they have to switch to a new job. Therefore, the defined benefit obligations gives employees an incentive to salvage the firm from bankruptcy and to retain their job. Traditional lenders such as banks or hedge funds do not face such losses and incentives in bankruptcy. Due to their lack of diversification and high costs of bankruptcy, defined benefit claimants have high incentives to renegotiate with the firm privately and to avoid the uncertain bankruptcy process.

In light of these similarities and differences between defined benefit claimants and other firm creditors, whether defined benefit claimants influence the likelihood of Chapter 11 bankruptcy is an empirical question. To address this question, I control for the role of traditional lenders in bankruptcy and capture any additional effect that defined benefit claimants may have. Firm leverage is the most common measure used in the literature to account for the role of firm creditors in bankruptcy. However, the traditional leverage measure includes only short-term liabilities and long-term debt and ignores all other firm obligations. Since firms consider their overall indebtedness when they decide whether to file for bankruptcy or not, I am interested in accounting for all firm obligations. I capture all firm liabilities by accounting for short-term liabilities and long-term debt, all other balance sheet obligations as well as two of the largest off-balance sheet liabilities: defined benefit obligations and operating leases. Thus, I am able to control for the influence of all major firm obligations on the decision to file for bankruptcy.

To capture the role of pension claimants in times leading to bankruptcy, I need a measure of their influence relative to that of the firm's other creditors. I proxy for

defined benefit claimants' role with the ratio of defined benefit liabilities to overall liabilities as measured in the last fiscal year prior to the bankruptcy filing. The ratio captures pension claimants' influence relative to that of the firm's other creditors. In my tests, I account for the impact of the firm's overall indebtedness and I study how the composition of firm lenders, and pension claimants in particular, influences the likelihood of bankruptcy. In this way, I am able to investigate the incremental impact that defined benefit claimants have on the bankruptcy probability beyond that of the firm's other lenders.

Following the above reasoning, the main hypothesis under study in this paper is as follows:

Hypothesis: *Defined benefit pension liabilities are associated with a lower likelihood of bankruptcy as compared to non-defined benefit liabilities (i.e. substituting a dollar of financial liabilities for a dollar of defined benefit pension liabilities leads to a lower likelihood of bankruptcy).*

Overall, the paper's main idea can be summarized with the following example: consider two hypothetical firms that are identical in all respects except for the size of their defined benefit obligations. Both firms have $100 of debt, but the composition of their liabilities differs: one firm has $50 in financial debt and $50 in defined benefit pension debt, and the other firm has $75 in financial debt ant $25 in pension debt. The question is, are these two firms equally likely to file for bankruptcy?

In the main tests, I proxy for the role of defined benefit claimants in bankruptcy with the ratio of defined benefit pension liabilities relative to overall liabilities. I consider the full defined benefit liabilities rather than the unfunded portion of the pension obligation since focusing on the plan's funding status has some important limitations. In particular, the funding status in a given year reflects the plan's claim on cash flows for that year but ignores the impact the plan may have in future years. For example, for the same percentage decline in asset values, a large defined benefit plan will experience a higher level of underfunding than a small plan and thus, the large plan will create a different level of bankruptcy risk for the sponsoring company. Arnott and Gersovitz (1980) and Shivdasani and Stefanescu (2010) build

a strong case for consolidating defined benefit assets and liabilities with firms' balance sheets assets and liabilities instead of focusing on the plan's funding status. Following their reasoning, I study the full amount of the defined benefit pension obligation and how it relates to the firm's overall liabilities.

2.3 Data Sources and Summary Statistics

2.3.1 Sample

The sample in this paper is constructed to aid identification. Since the decision to sponsor a defined benefit plan is endogenous, I focus only on firms with defined benefit pension plans. In this way, the choice to sponsor a pension plan is taken for granted and I compare the bankruptcy likelihood and outcomes across defined benefit sponsors only. Moreover, previous studies on Chapter 11 have documented that bankrupt firms differ from non-bankrupt companies along various dimensions. Following the literature, I account for these differences by matching bankrupt companies to non-bankrupt firms in the same industry, closest in size and in the last fiscal year prior to the bankruptcy filing (Altman, 1968; Chava and Jarrow, 2004). By design, I take the choice of sponsoring a defined benefit plan as given, and I compare bankrupt defined benefit firms to similar non-bankrupt defined benefit firms. Thus, any marginal variation in defined benefit pension liabilities should be plausibly exogenous[14].

To create the sample, I start with all defined benefit sponsors in the Compustat Pension Annual file from 1987 to 2012 with non-missing information on the pension variables of interest[15]. The choice of 1987 as the starting year is warranted

[14]The main underlying assumption behind the matching procedure is that the endogenous differences between the two sets of firms are driven by observables which I am controlling for.

[15]Apart from Compustat, pension data is also available from firms' Form 5500 filings with the Department of Labor (DOL). However, Form 5500 data are difficult to link to Compustat since employer identification number and firm name are the only firm identifiers. Even further, subsidiaries that are more than 80% owned by the parent can report their pension obligations separately from the parent firm. Therefore, it becomes crucial to aggregate subsidiaries' information with the parent filings to obtain a full representation of the firm's pension assets and liabilities from Form 5500 filings (Rauh, Stefanescu, and Zeldes, 2012). Overall, use of Form 5500 data significantly constrains the sample size and also limits the accuracy with which I can identify defined benefit pension assets

by changes in accounting standards: until 1987, the accounting rules on defined benefit pension disclosure were not standardized and thus, defined benefit pension variables are not comparable across firms or over time prior to this year. Moreover, significant pension-related assets and obligations prior to 1987 are not recognized on firms' financial statements. Therefore, my sample begins in 1987 when the accounting rules became standardized. The sample ends in 2012 since this is the last year for which I have information on Chapter 11 bankruptcies.

Next, I obtain financial data for the sample of defined benefit pension sponsors from Compustat. To alleviate concerns that Compustat pension data consolidates domestic and international pension plans, I select firms which are domiciled in the U.S[16]. I restrict the sample to firms with total assets worth $100 million or more, measured in 1980 dollars that file Form 10-K with the Securities and Exchange Commission (SEC) not less than three years prior to the bankruptcy case. These filters are necessary because later I identify Chapter 11 cases from a sample which was constructed based on these criteria. In addition, I exclude all firms with missing information for the main variables used in this study, as well as firms in the utilities and financial industries. Industry affiliation is based on the Fama and French 48-industry classification. All firm-level variables are expressed in constant 1987 dollars. To mitigate the influence of outliers, I winsorize all variables at the 1% level. The sample consists of 2,007 unique defined benefit plan sponsors and 20,546 sponsor-year observations.

Out of the sample of defined benefit sponsors, I identify Chapter 11 filings using Lynn M. LoPucki's Bankruptcy Research Database (BRD). The BRD contains information on all bankruptcy filings (Chapter 11) and liquidation filings (Chapter 7) from 1980 to 2012 for U.S. firms with assets of $100 million or more, measured in 1980 dollars. From the original set of 961 filings on the BRD, I select all Chapter 11 filings by defined benefit sponsors in my sample[17]. The sample of bankrupt

and liabilities for some companies. For these reasons, I rely on Compustat for pension data.

[16]While focusing on Compustat firms domiciled in the U.S. alleviates the concern about domestic and international plan consolidation to some extent, some U.S. firms can have foreign subsidiaries which sponsor a defined benefit pension plan in the foreign country. For those firms, the pension variables on Compustat will include both the domestic and the U.S. pension amounts.

[17]In the sample period, there are 19 Chapter 7 filings. Of those, only 1 firm is not in the financial industry, and there is no pension information for that firm. Thus, my sample is constrained to Chapter 11 filings only.

defined benefit sponsors consists of 244 Chapter 11 filings by 219 unique pension sponsors from 1987 to 2012.

Next, I match bankrupt defined benefit sponsors to non-bankrupt defined benefit firms in the same industry, closest in size (defined as the logarithm of adjusted assets), and in the last fiscal year prior to the Chapter 11 filing. The matching procedure is motivated by existing literature and helps mitigate the large difference in the industry and size distribution across sample firms. In the final sample, there are 481 matched firm-year observations representing 417 unique defined benefit plan sponsors and 244 bankruptcy cases from 1987 to 2012.

2.3.2 Control Variables

In this paper, I am interested in controlling for the firm's financial position and studying the composition of firm creditors. While most studies focus on firms' short-term and long-term debt scaled by total assets as an estimate of firm indebtedness, Welch (2011) points out that this measure captures only half of firms' liabilities. As a result, the author recommends using all balance sheet liabilities to better represent firms' financial position. However, accounting for total balance sheet liabilities still ignores some large off-balance sheet obligations. In order to more accurately measure firms' indebtedness, I combine total balance sheet liabilities with two of the largest off-balance sheet firm obligations: defined benefit pension obligations and operating leases.

Although a defined benefit pension plan is legally a separate entity from the sponsoring firm, pension benefits represent an integral part of a firms financial liabilities from an economic perspective (Treynor, 1977). As sponsors need to use their financial resources to fulfill pension obligations, defined benefit assets and liabilities should be analyzed in the context of the sponsor's consolidated balance sheet. Following Shivdasani and Stefanescu (2010)'s consolidating approach, I add pension obligations to balance sheet liabilities and pension assets to firm assets to better capture firms' true financial position. Furthermore, a number of studies have documented that operating leases are an important consideration for firms. In particular, Eisfeldt and Rampini (2009) and Rampini and Viswanathan (2013) show that ignoring operating leases leads to understating firms' true degree of leverage.

Furthermore, Rauh and Sufi (2012) provide evidence that accounting for operating lease commitments improves the ability to explain capital structure variation in the cross section. In light of these findings, I consolidate operating leases with balance sheet assets and liabilities and defined benefit assets and obligations to better represent firms' financial position and to account for all firm liabilities. Next, I turn to explaining in more detail how pension variables, operating leases, and all other control variables are constructed.

Defined Benefit Assets and Liabilities

The accounting standards which govern defined benefit pension plan reporting on firms' financial statements have changed over time[18]. In light of these changes, firms report different pension variables on their financial statements and in the footnotes to these statements over time. Accordingly, the way I measure pension assets and liabilities varies depending on the accounting reporting requirements. In particular, prior to 1998 firms reported pension variables separately for funded and underfunded plans. Therefore, for these fiscal years, I measure defined benefit obligations as the sum of the funded pension obligations and the underfunded pension obligations from the footnotes to financial statements. Similarly, defined benefit assets equal the sum of funded pension assets and underfunded pension assets for fiscal years before 1998. After 1998, firms no longer had to differentiate between plans based on funding status but instead reported aggregated pension assets and obligations from all defined benefit plans they sponsored. As a result, my measure of defined benefit obligations after 1998 equals the total value of all plan obligations reported in the footnotes to financial statements. In turn, defined benefit assets after 1998 equal the value of all plan assets. Thus, I have a measure of defined benefit assets and obligations. I also measure a plan's funding status as defined benefit assets less defined benefit obligations scaled by defined benefit obligations.

[18] Appendix A provides a more detailed discussion of the specific changes in accounting rules over time.

Operating Leases

Along with defined benefit assets and liabilities, I also consolidate operating leases with balance sheet assets and liabilities in order to account for the firms' overall capital and liabilities[19]. Although operating leases are reported off the balance sheet, numerous papers have demonstrated that operating leases are an important consideration for firms (Eisfeldt and Rampini, 2009; Rampini and Viswanathan, 2013; Rauh and Sufi, 2012). Both leases and secured debt represent cash flow commitments the firm must make to continue using the asset. Given the similarity between leases and secured debt, I integrate leases by capitalizing the operating lease commitments and considering them as both an asset and a debt secured against the asset. Following Rampini and Viswanathan (2013), I use $10\times$the rental expense as a measure of leased capital[20].

Balance Sheet Consolidation

Next, I consolidate the off-balance sheet defined benefit assets and liabilities and operating leases with balance sheet variables. While the total amounts of defined benefit assets and obligations are only reported in the footnotes to financial statements, some other pension variables are reported on firms' balance sheet and income statements. To avoid double-counting these variables, I subtract them when I consolidate defined benefit assets and obligations with balance sheet amounts. Once again, different variables appear on financial statements depending on the time period and I adjust my consolidated measures accordingly over time. Prior to 1998, if the pension expense[21] exceeded the cash contributions the firm made

[19]For accounting purposes, there are two different types of leases: capital leases and operating leases. In a capital lease, the lessee treats the leased assets as if they have been acquired, so a capitalized asset and liability appear on the balance sheet. In an operating lease, the lease payments are expensed and no asset or liability is recorded on the balance sheet. Instead, operating leases are reported in the footnotes to the balance sheet.

[20]If we assume that a firm borrows at a rate of 6%, the approximation of $10\times$the rental expense used to calculate operating leases assumes a 15-year life of the lease.

[21]The pension expense for a defined benefit pension plan is the employer's annual cost of maintaining the pension plan. The pension expense depends on a number of future events, such as estimates of employees lifespan, employee tenure, and employees' pay level just prior to retirement.

to the defined benefit plan, a pension liability was reported on the balance sheet. In turn, if the pension expense was lower than the firm's cash contributions to the plan, a pension asset appeared on the balance sheet. However, as mentioned above, prior to 1998 all pension variables were reported separately for funded and underfunded plans, so firms' balance sheets would contain a pension asset or liability for funded plans and a pension asset or liability for underfunded plans. When I add total defined benefit assets and liabilities to balance sheet assets and liabilities, I subtract the pension assets or liabilities which already existed on the balance sheet to avoid counting them twice[22].

Between 1998 and 2006, firms still reported an asset (a liability) on the balance sheet if the pension expense was higher (lower) than the cash contributions, but in this period firms aggregated pension variables across plans regardless of their funding status. Once again, for these fiscal years I subtract the pension amounts which already appear on the balance sheet when I consolidate defined benefit assets and obligations with the firm's assets and liabilities. Lastly, for fiscal years after 2006, firms no longer report the difference between the pension expense and cash contributions on their financial statements. Instead, firms' balance sheet include the plan's funding status, defined as the difference between defined benefit assets and obligations from the footnotes. Therefore, when I consolidate defined benefit assets and obligations with balance sheet amounts after 2006, I subtract the funding status from consolidated assets when it is positive (i.e. when the plan in overfunded) and I subtract the funding status from consolidated liabilities when it is negative (i.e. when the plan is underfunded) since those amounts represent assets and liabilities which already existed on the balance sheet.

After accounting for the pension variables which already appear on financial statements, I can consolidate the off-balance sheet amounts with balance sheet assets and liabilities. I construct two new measures which I refer to as adjusted assets and adjusted liabilities. Adjusted assets include the book value of firm assets plus the values of operating leases and defined benefit assets, less the pension assets already included on the balance sheet. I use adjusted assets as a measure of firm size which accounts for both balance sheet and off balance sheet assets. Moreover,

[22]If a firm's balance sheet reports both a pension asset and a pension liability, I subtract the pension asset from the balance sheet asset and the pension liability from the balance sheet liability.

I scale all variables which are usually scaled by balance sheet assets by adjusted assets instead. Adjusted liabilities equal the sum of total balance sheet liabilities plus defined benefit obligations and operating leases, less the pension liabilities already included on the balance sheet. I use adjusted liabilities as a measure of firm liabilities. In addition, I scale defined benefit obligations by adjusted liabilities to capture the role of pension claimants relative to all claimants, i.e. the size of their defined benefit pension plan in relation to all liabilities. Last, I define additional leverage as adjusted liabilities less short-term and long-term debt, scaled by adjusted assets. Additional leverage is a measure of firm debt which combines balance sheet liabilities apart from the traditional short-term and long-term debt with the largest off-balance sheet obligations: pension obligations and operating leases. In turn, financial leverage equals short-term and long-term debt scaled by adjusted assets. Therefore, the measure of leverage used in this thesis differs from the traditional measure used in prior studies in that it is scaled by adjusted assets rather than just those assets reported on the balance sheet.

Other Control Variables

Following the literature, I control for several variables that have been found to be related to the likelihood that firms file for Chapter 11 bankruptcy. In particular, I include cash to adjusted assets and cash flow volatility as proxies for the firms' ability to meet short-term commitments and the potential to generate working capital funds. Moreover, since less profitable firms are likely to become less liquid and more highly geared, I control for profitability, or return on assets, measured as operating income before depreciation over adjusted assets. I use the market-to-book ratio as a measure of firm value. I control for firms' dividend policy, R&D expenses and S&P credit ratings as those variables proxy for financial constraints and firms' overall health.

Furthermore, to control for firms' financial strength and the likelihood of defaulting on debt agreements, I include firms' S&P credit rating in all specifications. To use the rating in the main tests, I convert it to a numerical scale with values between zero and one. Following the methodology outlined in Rauh (2009), if the firm has a AAA S&P credit rating, the credit rating variable equals 0.929; if the

firm has a D rating, the credit rating variable equals 0.042; and each of the rating steps in between raises the credit rating variable by 0.042. In my sample, roughly half of defined benefit sponsors have a bond rating, which is twice the number of firms in the Compustat universe. Observations with no credit rating receive a value of zero for that data item. To account for the substitution of missing values with zeros, I include an indicator variable for observations with no credit rating.

All other variables are measured as is standard in the literature and are defined in Table 2.1.

2.3.3 Summary Statistics

Table 2.2 reports descriptive statistics for my sample of 481 defined benefit sponsors. Panel A presents the industry distribution of sample firms. Most defined benefit sponsors in my sample are in the Retail, Transportation, and Steel Works industries, with 15%, 8% and 7% of all sponsors, respectively. By construction, bankrupt defined benefit sponsors are matched to non-bankrupt sponsors in the same industry so the industry distribution across bankrupt sponsors is identical to that of all defined benefit firms in the sample presented in Panel A.

Panel B of Table 2.2 presents summary statistics for firm and pension plan characteristics for the full sample and for two subsamples of firms: bankrupt defined benefit sponsors and the matched defined benefit sponsors that are solvent. Defined benefit sponsors in the full sample have a median size of $511 million. Median firm size increases to $584 million when defined benefit assets and operating leases are accounted for. Tangible assets represent approximately 33% of adjusted assets. Firms hold on average 7% of adjusted assets in cash and the average return on assets equals 9%. In terms of off-balance sheet obligations, operating leases represent on average 30% of adjusted assets. Defined benefit assets make up on average 15% of adjusted assets, whereas defined benefit liabilities are on average 18% of assets. In addition, defined benefit obligations are on average 14% of sample firms' adjusted liabilities, which include both balance sheet and off-balance sheet obligations. Defined benefit firms in the full sample are 36% levered on average. In turn, additional leverage which includes all balance sheet liabilities other than short-term and long-term debt, as well as defined benefit obligations and op-

erating leases equals on average 89% of adjusted assets.

Bankrupt defined benefit sponsors differ from non-bankrupt sponsors across nearly all firm characteristics, which necessitates the matching procedure described above. As the last part of Panel B shows, matching eliminates the difference in size among bankrupt defined benefit sponsors and control firms. In addition, several other differences in firm-level characteristics become insignificant across the two types of firms. Altogether, the subsample of non-bankrupt defined benefit sponsors matched to bankrupt sponsors reduces the differences between defaulting firms and controls.

Panel C in Table 2.2 reports the pairwise correlation coefficients for the main variables used this essay's tests. As the coefficients in the table indicate, none of the variables are strongly correlated.

2.4 Determinants of the Likelihood of Bankruptcy

In this section I ask whether defined benefit claimants are related to the likelihood that firms file for Chapter 11 bankruptcy. I control for the firm's overall indebtedness and consider if the ratio of pension obligations to overall liabilities provides explanatory power for the decision to file for bankruptcy. The premise of this design is that once I account for all firm liabilities, the contribution of pension obligations to adjusted liabilities will capture the role of defined benefit claimants in times leading up to bankruptcy.

2.4.1 Regression Specification

Previous bankruptcy papers have implemented different specifications to study the likelihood of Chapter 11, such as discriminant analysis (Altman, 1968), logistic regression in event time (Lo, 1986), and logistic regression in panel data (Shumway, 2001). Due to endogeneity concerns, I restrict my attention to defined benefit sponsors in bankruptcy and their matched counterparts. Therefore, the most appropriate specification to study the role of defined benefit claimants on the probability of Chapter 11 in this cross sectional sample is a logistic regression of the

likelihood to file for bankruptcy, estimated as follows:

$$\begin{aligned} Bankrupt_{it} = \alpha_0 + \alpha_1 \left(\frac{DB\ Liabilities}{Adjusted\ Liabilities} \right)_{it-1} + \alpha_2 Leverage_{it-1} + \\ + \alpha_3 Additional\ Leverage_{it-1} + \alpha_4 Cash_{it-1} + \alpha_5 CF\ Volatility_{it-1} + \\ + \alpha_6 Tangibility_{it-1} + \alpha_7 ROA_{it-1} + \alpha_8 Market\ to\ Book_{it-1} + \\ + \alpha_9 Dividend\ Payer_{it-1} + \alpha_{10} R\&D_{it-1} + \alpha_{11} S\&P\ Rating_{it-1} + \\ + \alpha_{12} No\ Rating_{it-1} + \varepsilon_{it-1} \end{aligned} \tag{2.1}$$

where *Bankrupt* is a dummy variable that equals one if a firm files for Chapter 11 and zero otherwise and ε is the residual. The primary variable of interest is the ratio of defined benefit liabilities to adjusted liabilities. The coefficient α_1 is of particular interest as it elicits the fraction that defined benefit liabilities contribute to the firm's overall indebtedness. Thus, the coefficient proxies for the influence of defined benefit claimants among all firm creditors.

While size is an important determinant of bankruptcy, I do not control for firm assets in the regression specification because size is one of the dimensions on which I match bankrupt sponsors to non-bankrupt controls. As the summary statistics in Panel B, Table 2.2, showed, the matching removed the size differences across the two subsamples. In addition, I do not include industry or year fixed effects in this specification since I also match firms on these two dimensions.

2.4.2 Determinants of a Chapter 11 Filing

The results from estimating equation (2.1) are reported in Table 2.3. The first two columns report results in terms of marginal effects from a logistic regression. The last two columns report the coefficients from a linear probability model. Standard errors are robust and are clustered at the industry level[23].

Model 1 in Table 2.3 considers only three determinants of the likelihood of bankruptcy: the two measures of firm leverage and the ratio of defined benefit obli-

[23]The results are robust to different clustering specifications.

gations to adjusted liabilities. This specification tests if the proportion of pension liabilities relative to all firm liabilities influences the likelihood of bankruptcy when the total firm indebtedness is held constant. Consistent with previous studies, I find a positive relationship between firm leverage and the likelihood of bankruptcy. Moreover, additional leverage which includes all remaining balance sheet liabilities and the two largest off-balance sheet obligations is also a positive and significant determinant of the probability of bankruptcy. While higher leverage is associated with a higher probability of bankruptcy, when defined benefit liabilities constitute a larger share of overall liabilities, firms are less likely to file for bankruptcy. In particular, increasing the ratio of defined benefit liabilities to adjusted liabilities is associated with a marginal effect of -0.31 on the likelihood that a defined benefit sponsor files for bankruptcy. The interpretation of the marginal effects is as follows: A one standard deviation increase in the measure of adjusted leverage is associated with a 4% increase in the likelihood of bankruptcy. While firm leverage in terms of both financial liabilities and additional liabilities is associated with a higher likelihood of bankruptcy, when these liabilities are composed of more defined benefit obligations, the likelihood of bankruptcy declines. Thus, the results from model 1 confirm that the composition of firm liabilities matters and that defined benefit claimants play a distinctive role in the likelihood of Chapter 11.

The second model in Table 2.3 tests the full specification from equation (2.1) which includes other known determinants of bankruptcy. In the main specification, higher leverage and additional leverage are positively related to the likelihood of Chapter 11. At the same time, larger cash holdings, a higher share of tangible assets and higher profitability are associated with a lower incidence of bankruptcy. In addition, firms that pay dividends and those that have high credit ratings are less likely to file for bankruptcy. The signs of the coefficients of these control variables are in line with prior work on the determinants of Chapter 11 bankruptcy. The only exception is the negative sign on the indicator variable of no credit rating, which suggests that firms without a credit rating are less likely to file for bankruptcy.

Holding the known determinants of bankruptcy constant, the results in model 2 show that defined benefit claimants are related to a lower likelihood of Chapter 11 bankruptcy. In particular, a one standard deviation increase in the proportion of defined benefit liabilities to adjusted liabilities is associated with a 3% decrease

in the likelihood of bankruptcy. The effect is economically meaningful: given the unconditional sample average of bankruptcy of 50%, defined benefit claimants are associated with a a 6% decline in the probability of Chapter 11.

The last two models in Table 2.3 estimate equation (2.1) in a linear probability model framework. The linear probability model results are included to gauge the logistic regression estimates and their magnitudes. As the last two columns show, the results from the linear probability model support the findings reported in the rest of the table. All signs and magnitudes in the linear model are close to identical with the marginal effects in the logistic model. Once again, the ratio of defined benefit liabilities to adjusted liabilities is negatively related to the probability of bankruptcy.

In summary, I find that the higher the contribution of defined benefit obligations to adjusted liabilities, the lower the likelihood that the firm files for bankruptcy. These findings are consistent with the idea that defined benefit claimants are more likely to avoid reorganization in Chapter 11. Pension claimants have high incentives to avoid bankruptcy due to their lack of diversification and because of the higher costs of Chapter 11 they face compared to traditional lenders.

2.5 Determinants of Bankruptcy for All Compustat Firms

The main sample used in this study is constructed with the intent to address endogeneity concerns. However, it is not clear to what extent the main sample results apply to the broader universe of Compustat firms. The main sample focuses on defined benefit sponsors only, with bankrupt sponsors matched to comparable non-bankrupt sponsors. To determine the extent to which the main sample results extend to all firms, in this section I consider the role of defined benefit claimants in the full Compustat universe. In the sample of all Compustat firms, I estimate two different specifications to determine if defined benefit claimants influence the likelihood of bankruptcy. First, I control for the role of defined benefit claimants by using a dummy variable that identifies defined benefit sponsors. Second, I control for the role of pension claimants with the ratio of defined benefit liabilities to

overall liabilities, as in equation (2.1).

2.5.1 Sample of All Compustat Firms

In order to construct the sample of all Compustat firms, I start with all companies on Compustat from 1987 to 2012 which meet the original BRD sampling criteria: have assets worth $100 million or more in 1980 dollars, and file Form 10-K with the SEC within three years prior to the bankruptcy case. I identify defined benefit plan sponsors among all firms from the Compustat Pensions Annual file. Next, I identify Chapter 11 cases from the BRD. I delete all firms with missing data for the main control variables used in this study, as well as firms not domiciled in the U.S and those in the utilities and financial industries. All firm-level variables are expressed in constant 1987 dollars and are winsorized at the 1% level. The final sample used in this section consists of 4,708 unique firms (41,225 firm-year observations) and 461 Chapter 11 filings by 430 unique firms from 1987 to 2012.

Table 2.4 provides summary statistics for the sample of all Compustat firms. Panel A outlines the industry distribution of three groups of firms: all companies that do not sponsor a defined benefit plan, all defined benefit sponsors, and all bankrupt firms from the Compustat universe. Most firms without a pension plan come from the Business Services, Retail and Petroleum industries, constituting 16%, 12% and 7% of all companies, respectively. Alternatively, among defined benefit sponsors, Machinery, Retail, and Chemicals represent the industries with highest firm concentration, with 7%, 7%, and 6%, of all firms, respectively. The industry distribution of defined benefit sponsors in the full Compustat database is comparable to that in the main sample of defined benefit sponsors only, where the most represented industries are the Retail, Transportation, and Steel Works. Overall, Panel A of Table 2.4 shows that in the sample of all Compustat firms, defined benefit sponsors are largely comparable to firms without a defined benefit plan in terms of industry representation. The last column of Panel A shows the industry distribution of bankruptcy cases in the sample of all Compustat firms. Most bankruptcies in both the full Compustat sample and the main sample occur in the Retail and Transportation industries.

Panel B of Table 2.4 presents summary statistics for firm and defined benefit

plan characteristics for all Compustat firms and for two subgroups of firms- those that sponsor a defined benefit plan and those that do not. In the sample of all Compustat firms, average firm size is $569 million in terms of balance sheet assets and $600 million in terms of balance sheet and off-balance sheet amounts. On average, 32% of adjusted assets are invested in property, plant and equipment and the average return on assets is 13%. Firms hold 12% of adjusted assets in cash and cash flow volatility is close to 2% on average. Out of all Compustat firms, close to 50% sponsor a defined benefit pension plan. Sample firms hold on average 27% of adjusted assets in financial leverage and another 61% in additional leverage. Last, 1% of all Compustat firms file for Chapter 11 bankruptcy.

The next part of Panel B shows that defined benefit sponsors have a median size of $962 million which increases to $1,074 million when off-balance sheet assets are included. Tangible assets represent 33% of adjusted assets on average and return on assets is 14%. Defined benefit sponsors hold an average of 8% of adjusted assets in cash and the volatility of their cash flows is 1%. Pension sponsors have an average market-to-book ratio of 1.8 and invest 2% of adjusted assets in research and development. In terms of non-balance sheet obligations, median operating leases to adjusted assets equal 14%. Defined benefit assets represent on average 15% of adjusted assets, whereas defined benefit liabilities are on average 16% of adjusted assets. In addition, defined benefit obligations equal 15% of adjusted liabilities on average. Defined benefit firms are 27% levered in terms of financial leverage and 58% levered in terms of adjusted leverage. In addition, 7% of defined benefit sponsors file for Chapter 11 bankruptcy. Overall, defined benefit sponsors in the full sample of all Compustat firms are comparable to defined benefit sponsors in the main sample.

In comparison, non-defined benefit firms differ from pension sponsors along all firm characteristics. In particular, firms that do not sponsor a defined benefit plan are smaller, less profitable, have less tangible assets, are less likely to pay dividends or have a credit rating than defined benefit sponsors. Moreover, firms without a pension plan are less levered in term of both financial leverage and additional leverage, yet they are more than twice as likely to file for bankruptcy as defined benefit sponsors. Overall, the summary statistics for all Compustat firms highlight vast differences among firms which sponsor a defined benefit plan and those that

do not.

2.5.2 Regression Specification

In this subsection, I study the impact of defined benefit claimants on the likelihood of bankruptcy in the sample of all Compustat firms. To proxy for the influence of pension claimants, I first use a dummy variable equal to one if a firm in the sample sponsors a defined benefit pension plan, and zero otherwise. I estimate the following specification:

$$\begin{aligned} Bankrupt_{it} = {} & \alpha_0 + \alpha_1 DB\ Sponsor_{it-1} + \alpha_2 Leverage_{it-1} + \\ & + \alpha_3 Additional\ Leverage_{it-1} + \alpha_4 Size_{it-1} + \alpha_5 Cash_{it-1} + \\ & + \alpha_6 CF\ Volatility_{it-1} + \alpha_7 Tangibility_{it-1} + \alpha_8 ROA_{it-1} + \\ & + \alpha_9 Market\ to\ Book_{it-1} + \alpha_{10} Dividend\ Payer_{it-1} + \alpha_{11} R\&D_{it-1} + \\ & + \alpha_{12} S\&P\ Rating_{it-1} + \alpha_{13} No\ Rating_{it-1} + \gamma_j + \gamma_t + \varepsilon_{it-1} \end{aligned} \tag{2.2}$$

where *DB Sponsor* is an indicator variable which equals one if firm i sponsors a defined benefit pension plan in year t and zero otherwise, all other control variables are defined as previously[24], and γ_j and γ_t are industry and year fixed effects, respectively. The *DB Sponsor* indicator variable captures the effect of defined benefit claimants on the likelihood of Chapter 11 bankruptcy.

Since the dependent variable in equation (2.2) is binary, the natural specification of choice would be to estimate a logistic model. However, econometric estimators in binary response models with fixed effects may fail to converge on consistent estimators as the number of observations becomes large, a problem known as the incidental parameters problem (Neyman and Scott, 1948). Several solutions have been proposed in the literature to deal with this problem including estimating a linear probability model or a conditional logistic regression. Therefore, for all specifications, I report regression results from both the logistic model as well

[24] Variable definitions are also provided in Table 2.1.

as linear probability model and a conditional logistic regression. Since the conditional logistic regression results are not reported as marginal effects, the coefficient estimates are not comparable with those in the other specifications. Nevertheless, the conditional logit results are included for comparison.

Along with the pension sponsor indicator variable, I also consider the ratio of pension liabilities to overall liabilities as a measure for the role of defined benefit claimants. As a second specification, I replicate the estimation procedure in equation (2.1) on the sample of all Compustat firms. To retain non-defined benefit firms in the estimation, I interact the ratio of defined benefit liabilities to overall liabilities with the defined benefit sponsor dummy. Therefore, firms without defined benefit liabilities will have a value of zero for the ratio of defined benefit liabilities to adjusted liabilities. In particular, I estimate the following variant of equation (2.1):

$$\begin{aligned} Bankrupt_{it} = \alpha_0 + \alpha_1 \left(\frac{DB\ Liabilities}{Adjusted\ Liabilities} \right)_{it-1} \times (DB\ Sponsor)_{it-1} + \\ + \alpha_2 DB\ Sponsor_{it-1} + \alpha_3 Leverage_{it-1} + \alpha_4 Additional\ Leverage_{it-1} + \\ + \alpha_5 Size_{it-1} + \alpha_6 Cash_{it-1} + \alpha_7 CF\ Volatility_{it-1} + \alpha_8 Tangibility_{it-1} + \\ + \alpha_9 ROA_{it-1} + \alpha_{10} Market\ to\ Book_{it-1} + \alpha_{11} Dividend\ Payer_{it-1} + \\ + \alpha_{12} R\&D_{it-1} + \alpha_{13} S\&P\ Rating_{it-1} + \alpha_{14} No\ Rating_{it-1} + \gamma_j + \gamma_t + \varepsilon_{it-1} \end{aligned} \tag{2.3}$$

All variables are defined in Table 2.1. In this specification, including the *DB Sponsor* indicator variable accounts for the substitution of missing values for pension liabilities with zeros. Once again, the dummy captures the effect of sponsoring a defined benefit plan on the likelihood of bankruptcy. Moreover, equation (2.3) is estimated in a logistic, linear probability, and conditional logistic frameworks.

2.5.3 Results for the Sample of All Compustat Firms

In this subsection, I discuss the results from investigating whether the negative relationship between defined benefit claimants and the likelihood of bankruptcy

which is found in the main sample of this study is also present in the full Compustat universe.

First, I capture the impact of pension claimants on the probability of bankruptcy with a dummy variable for whether a firm in the sample sponsors a defined benefit plan or not. The results from estimating equation (2.2) are reported in Table 2.5. The dependent variable in all specifications equals one if a firm files for Chapter 11 bankruptcy in a given year, and zero otherwise. All specifications include industry and year fixed effects and standard errors clustered at the industry level.

Model 1 in Table 2.5 estimates the relationship between the likelihood of bankruptcy and the defined benefit sponsor dummy variable. Such a test captures the likelihood of bankruptcy for firms which sponsor a defined benefit plan versus those that do not. As the results show, defined benefit sponsors are negatively and significantly related to the likelihood of Chapter 11 bankruptcy. In particular, switching from not sponsoring a defined benefit plan to sponsoring a defined benefit plan is related to a 1% decline in the probability of bankruptcy. In model 2, I control for the pension dummy as well as financial leverage and additional leverage. This specification considers if defined benefit claimants are related to bankruptcy after controlling for overall firm indebtedness. Higher leverage in terms of both financial liabilities and additional liabilities is a positive and significant determinant of the likelihood of Chapter 11 bankruptcy. Holding leverage constant, defined benefit sponsors are less likely to file for bankruptcy than non-defined benefit firms.

Model 3 presents the results for the main specification in equation (2.2) which includes all firm-level controls. In line with the literature and with the results in Table 2.3, higher leverage is positively related to the likelihood of bankruptcy whereas larger cash holdings, higher profitability, higher market-to-book ratios, dividend payouts, and higher credit ratings are all negatively related to the incidence of bankruptcy. The negative and statistically significant coefficient of the *DB Sponsor* variable holds when firm characteristics are accounted for. The marginal effect from the logistic specification shows that switching from not sponsoring a defined benefit plan to sponsoring a defined benefit plan is related to a 1% decline in the probability of bankruptcy. Overall, the results from estimating equation (2.2) show that in the full Compustat sample, defined benefit sponsors are less likely to file for

bankruptcy than firms without pension plans.

The rest of Table 2.5 reports results of the same three specifications under different estimation procedures. Models 4 through 6 present estimates from linear probability regressions and models 7 through 8 report coefficients from conditional logit estimations. These estimations are included in the table to ensure that the results presented in the main specification are consistent and not influenced by the incidental parameter problem discussed above. Overall, the linear and conditional logistic models confirm the main results presented in the first three columns. Defined benefit sponsors are less likely to file for Chapter 11 bankruptcy than firms without defined benefit claimants under all specifications. All other explanatory variables have the same signs and significance across the alternative models.

Second, I capture the impact of pension claimants on the probability of bankruptcy with the ratio of defined benefit liabilities to overall firm liabilities. The results from estimating equation (2.3) are reported in Table 2.6. The dependent variable in all models equals one if a firm files for Chapter 11 bankruptcy in a given year, and zero otherwise. All specifications include industry and year fixed effects and standard errors clustered at the industry level.

Model 1 in Table 2.6 reports estimation results from a logistic regression of the probability of bankruptcy on overall leverage and the ratio of defined benefit liabilities to adjusted liabilities. Higher financial leverage and additional leverage are both associated with a higher likelihood of Chapter 11. However, controlling for overall firm indebtedness, defined benefit claimants are related to a lower incidence of bankruptcy. In particular, a higher ratio of defined benefit liabilities to adjusted liabilities is associated with a -0.04 marginal effect on the likelihood of bankruptcy. Overall, the results from the first model indicate that while firm leverage is associated with a higher likelihood of bankruptcy, when more of the firm's liabilities are composed of defined benefit obligations, the likelihood of bankruptcy declines. Therefore, the composition of firm creditors matters in the full sample as well.

Results from the main specification from equation (2.3) including all firm-level controls are presented under model 2 in Table 2.6. In the full specification, more levered firms are more likely to file for bankruptcy. At the same time, healthier firms with larger cash holdings, higher asset returns, more growth options, divi-

dend payouts and higher credit ratings are less likely to file for Chapter 11. The role of defined benefit claimants in the full specification remains unchanged: firms with more pension claimants relative to all other creditors are less likely to go bankrupt. Most importantly, the coefficient for the ratio of defined benefit liabilities to adjusted liabilities retains the same magnitude and significance when the firm controls are included. These results confirm that the contribution of defined benefit liabilities to adjusted liabilities remains a significant determinant of the likelihood of Chapter 11 bankruptcy even after controlling for known predictors of bankruptcy in the sample of all Compustat companies.

The remainder of Table 2.6 re-estimates the first two models under a linear probability and a conditional logit frameworks. The main variable of interest, the ratio of defined benefit liabilities to adjusted liabilities, retains the same sign and significance through these alternative specifications. In addition, the coefficients and significance of all other firm controls remain largely unchanged. Therefore, the results presented in the first two models are robust to the specification used.

Altogether, the results for firms in the Compustat universe confirm the main sample findings that defined benefit claimants are associated with a lower likelihood of bankruptcy. Among all Compustat firms, companies with defined benefit claimants are less likely to file for Chapter 11 than firms with only traditional lenders. Even further, the ratio of pension obligations to overall liabilities which captures the relative role of defined benefit claimants compared to other firm creditors is related to a lower likelihood of bankruptcy in the full Compustat sample. These results confirm that the main sample findings extend to the larger universe of firms.

2.6 Robustness Tests

In this section, I perform several robustness tests. In particular, I consider the relation between defined benefit claimants and bankruptcy under an alternative proxy for their influence and under a different measure of defined benefit liabilities. I also check whether investors incorporate the role of defined benefit claimants in times leading to bankruptcy as reflected in the stock market returns around bankruptcy

announcement.

2.6.1 Funding Status

The main proxy for the impact of defined benefit claimants on the likelihood of bankruptcy used in this study is the ratio of defined benefit pension obligations to overall firm liabilities. While defined benefit claimants care about the full amount of their promised future income, it is possible that the portion of their liabilities which is not covered by any assets may give them stronger incentives to influence the bankruptcy decision. In this subsection, I test whether this argument holds in my sample. If defined benefit claimants' actions are driven by the unfunded portion of their liabilities, then the effect of the ratio of pension obligations to overall liabilities will be even stronger for the subsample of firms with underfunded pension plans. To test this conjecture, I re-estimate equation (2.1) in the set of 351 firms with underfunded plans only. Table 2.7 reports these estimation results. The dependent variable in all models equals one if a firm files for Chapter 11 bankruptcy in a given year, and zero otherwise. Standard errors are robust and clustered at the year level.

Model 1 in Table 2.7 reports results for the likelihood of bankruptcy when firm indebtedness and pension claimants are considered. The positive relationship between financial leverage and additional leverage and bankruptcy confirms that leverage is a significant determinant of the likelihood of Chapter 11 for underfunded plans. Moreover, the ratio of defined benefit obligations to adjusted liabilities is negatively related to the probability of bankruptcy in the sample of firms with poorly funded pension plans. However, the marginal effect of the proxy for defined benefit claimants in this model is only significant at the 10% level.

The next model in Table 2.7 considers the role of defined benefit claimants when all firm-level controls are accounted for. In line with the results presented thus far, higher leverage positively predicts the likelihood of bankruptcy while cash holdings, profitability, dividends, and high credit ratings are negatively related to the probability of bankruptcy. More importantly, the ratio of defined benefit obligations to adjusted liabilities is negatively related to the likelihood of bankruptcy in the sample of underfunded plans when firm controls are included in the specifi-

cation.

The last two models in Table 2.7 report estimates from a linear probability model for the same specifications used in the first part of the table. The linear models' results reinforce the findings from the logistic regression and indicate a role for defined benefit claimants in firms with underfunded pension plans, albeit a less significant one.

In untabulated tests, I compare the results for the group of firms with underfunded pension plans to those of firms with fully funded and overfunded plans. Such a comparison helps determine whether defined benefit claimants' bargaining power prior to bankruptcy is driven solely by the underfunded portion of their obligations or whether the full amount of the pension obligation matters to pension claimants. There are 130 firms in the sample whose defined benefit plans are fully funded or overfunded. I estimate equation (2.1) on this subset of firms and find results comparable to those for the sample of underfunded pension plans. Overall, I find no heterogeneity across the two subsamples in terms of pension claimants' impact on the likelihood of bankruptcy. These results provide some support for the idea that underfunding does not drive the main results presented in this paper. However, given the small number of firms with fully funded defined benefit plans, the data may not be rich enough to disentangle these effects.

2.6.2 Alternative Measure of Defined Benefit Liabilities

In the main tests, I measure defined benefit liabilities as the projected benefit obligation (PBO), which is the present value of all benefits earned by employees to date for service rendered prior to that date, plus the present value of projected benefits attributable to future salary increases. An alternative measure of defined benefit liabilities is the accumulated benefit obligation (ABO), which is the present value of benefits earned by employees for services rendered to date assuming the pension plan is terminated in the same year. In bankruptcy, the firm is only liable for the ABO portion of the pension obligation as bankrupt firms are held responsible for paying for services already rendered and not for future expected benefits.

In this subsection, I study the role of defined benefit claimants as measured by the ratio of ABO liabilities to adjusted liabilities, instead of the PBO liabilities

to adjusted liabilities used in the main specifications. Once again, I account for the different accounting standards over time and consolidate underfunded ABO obligations whenever necessary. Due to data issues, only 260 of the 481 sample firms report ABO liabilities, which does not allow me to compare the main sample results to these small subsample results. Therefore, I study the impact of using the ABO in the sample of all Compustat firms. In the Compustat universe, 14,951 firm-year observations out of the 41,225 observations have ABO data. Results from estimating equation (2.1) with the ABO measure replacing the PBO are reported in Table 2.8. The dependent variable in all specification is the bankruptcy indicator.

The first model in Table 2.8 controls for leverage and the role of defined benefit claimants as measured by the ratio of ABO liabilities to adjusted liabilities. In the full Compustat sample, higher leverage leads to higher incidence of bankruptcy but when firm liabilities are comprised of more pension obligations, the likelihood of Chapter 11 declines. In particular, a higher ratio of ABO liabilities to adjusted liabilities is associated with a -0.02 marginal reduction in the probability of bankruptcy. Hence, the composition of firm lenders matters even when defined benefit liabilities are measured as earned pensions instead of earned and future pensions.

The results from the first model are robust to the inclusion of the remaining firm controls. As the second column in Table 2.8 shows, the other firm-level controls enter the regression specification with similar magnitudes and the same signs as in the previous tables. The main specification indicates a negative relationship between pension claimants and Chapter 11 bankruptcy. These results are further confirmed in the linear probability model results presented in the last two columns of Table 2.8.

Overall, the results in Table 2.8 confirm that defined benefit claimants are related to a lower likelihood of bankruptcy regardless of the proxy used to estimate their role. The PBO is the main measure of the role of defined benefit claimants used in this essay's tests for several reasons. While the firm is only liable for the ABO portion of defined benefit obligations upon bankruptcy, the ABO ignores any projected benefit and salary increases beyond the estimation date. In addition, from the standpoint of pension claimants, both the amounts they currently accumulated and future increases are relevant since that was the pension amount promised to

them by the firm. Ippolito (1985a) makes a similar observation that under the implicit contract view of pensions, defined benefit claimants care about the full pension amounts promised to them, rather than just the ABO amount. Therefore, while the main results hold under either specification, the main tests focus on the PBO as the closest proxy for the role of defined benefit claimants in times leading to bankruptcy[25].

2.6.3 Event Study Around Chapter 11 Filing

If defined benefit claimants are associated with a lower likelihood of bankruptcy, investors' valuations of the firm may reflect this relationship. Previous studies have documented that investors incorporate pension plan assets and liabilities in various measures of firm performance, such as the firms' market valuation (Franzoni and Marin, 2006), equity beta (Jin et al., 2006), and debt rating (Carroll and Niehaus, 1998), among others. In this subsection, I consider whether investors consider the role of defined benefit claimants, as measured by cumulative abnormal returns (CARs) earned by pension sponsors around Chapter 11 announcements.

In my sample of 244 bankrupt defined benefit sponsors, there are 89 bankruptcies with available stock market return information for the filing firm around the Chapter 11 bankruptcy announcement date. For these firms, I estimate the median ratio of defined benefit obligations to overall liabilities and separate firms into two groups based on whether they fall above the median (45 firms) or below the median (44 firms)[26]. Figure 2.2 plots the two groups' cumulative abnormal returns calculated with the CRSP value-weighted return as the benchmark in the [-5,+5] window with day 0 as the date of the Chapter 11 filing. The stock market reacts negatively

[25] As Begley et al. (2015) discuss, the PBO and the ABO are close to identical in frozen defined benefit pension plans. If firms decide to no longer sponsor a defined benefit plan, they can freeze their plan. As a result, future pension payouts will be estimated based on current salary levels and not on future salaries, effectively equalizing PBO and ABO. Therefore, for firms in my sample with frozen pension plans, my measure of defined benefit obligations, PBO, coincides with the alternative measure of pension obligations, ABO.

[26] In the sample of 244 bankrupt defined benefit sponsors, the median ratio of defined benefit obligations to adjusted liabilities equals 0.087. This amount falls between the median ratio of defined benefit obligations to adjusted liabilities of 0.096 in the sample of 481 pension sponsors in the main sample and that of 0.077 in the sample of all pension sponsors in Compustat.

to bankruptcy filings in general which is evident from the overall negative returns in the period. However, the returns for firms with higher ratios of defined benefit obligations to adjusted liabilities flatten out prior to the filing date, whereas the returns for firms with smaller ratios of defined benefit liabilities to overall liabilities continue to fall throughout the days leading up to the bankruptcy filings. These stock price reactions suggest that investors may expect that firms in which defined benefit claimants are stronger may be less likely to file for bankruptcy. However, given the small number of firms presented in Figure 2.2, these stock price reactions provide anecdotal support for the main findings in this paper at best.

2.7 Conclusion

In this paper, I study the impact of defined benefit claimants on the firm's decision to file for Chapter 11 bankruptcy. Using the proportion of defined benefit obligations to overall liabilities as a proxy for the impact of pension claimants on corporate affairs, I find that defined benefit claimants are associated with a lower likelihood of Chapter 11 bankruptcy. These findings are robust to firm-level controls and to different specifications. Moreover, the results do not depend on the specific proxy for the role of defined benefit claimants and are consistent in alternative subsamples. Overall, the results presented in this essay indicate a role for defined benefit claimants in one important firm decision: the choice to file for bankruptcy reorganization. This essay's findings point to the importance of accounting for firms' defined benefit claimants in studies of creditor negotiations prior to Chapter 11 bankruptcy.

More broadly, my analysis raises a question about the composition of firms' creditors and the role of non-traditional lenders, such as defined benefit claimants, in times of financial distress. Defined benefit obligations represent a firm liability. However, defined benefit claimants differ from traditional creditors along many dimensions, and in their lack of diversification and the higher costs of bankruptcy that they experience, in particular. Thus, defined benefit claimants differ from traditional lenders in their willingness to avoid court reorganization. The collective evidence from previous studies and this paper suggests that the overall effect of

defined benefit claimants among the firms' creditors is largely positive.

Figures and Tables

Figure 2.1: U.S. Corporate Debt from 1987 to 2012

This figure shows the amount of corporate debt for U.S. companies from 1987 to 2012. The blue bars report the total dollar amount of corporate financial debt, defined as short-term liabilities plus long-term debt, from firms' financial statements on Compustat. The dark blue line reports the total dollar amount of corporate defined benefit pension obligations, measured as the pension benefit obligation (PBO), from the footnotes to financial statements on Compustat. All dollar amounts are adjusted for inflation and are presented in trillions of 2012 dollars.

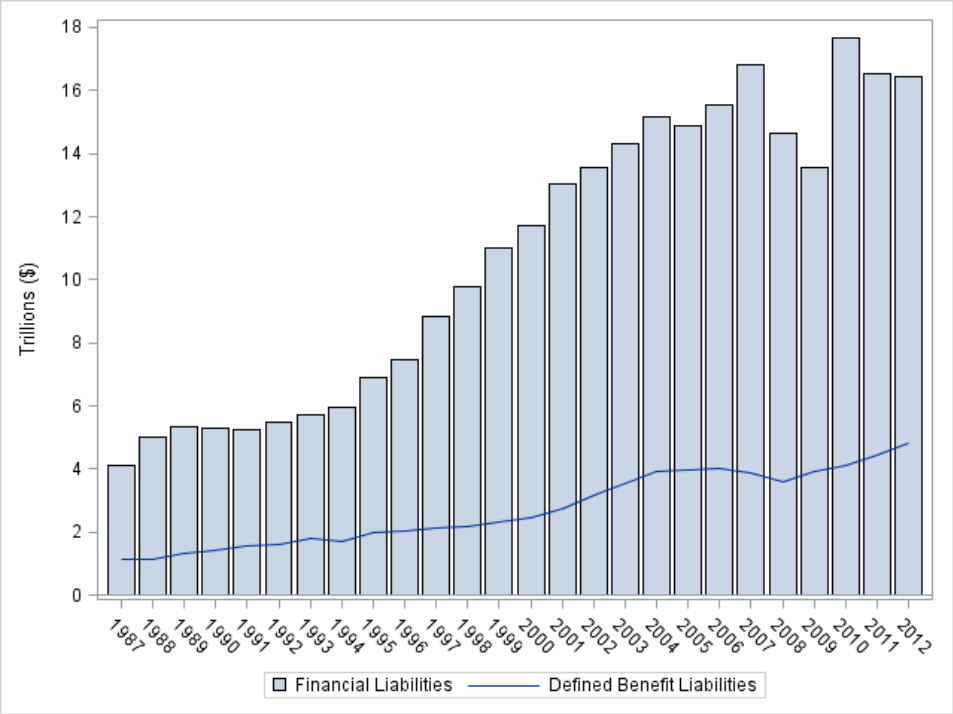

Figure 2.2: Event Study Around Chapter 11 Filing

This figure shows the cumulative abnormal returns (CARs) adjusted by the CRSP value-weighted return from five days before to five days after a Chapter 11 filing by defined benefit pension sponsors. The solid line depicts CARs for 45 firms whose ratio of defined benefit obligations to adjusted liabilities (PBO/AL) is higher than the median ratio of pension obligations to adjusted liabilities in the sample. The dashed line represents CARs for 44 firms whose ratio of defined benefit obligations to adjusted liabilities is lower than the sample median ratio of pension obligations to adjusted liabilities.

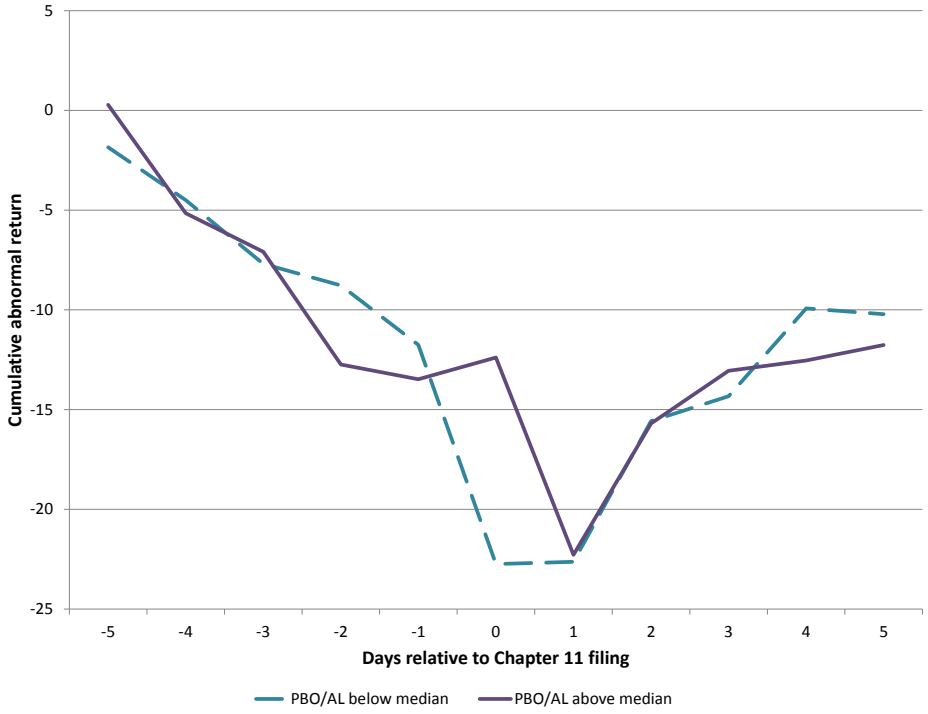

Table 2.1: Variable Definitions

This table provides definitions for the variables used in this study. Compustat data items are included in brackets. Note that due to the Compustat naming convention, the same variable name, pcppao, refers to different variables over time. Prior to 1998, pcppao refers to the pension cost for overfunded plans. Between 1998 and 2006, a positive value of pcppao refers to the prepaid pension cost, while a negative value of pcppa refers to the accrued pension cost. After 2006, pcppao refers to plan funding status.

Variable	Definition
Additional Leverage	[Adjusted Liabilities - short-term debt (dlc) - long-term debt (dltt)]/ Adjusted Assets
Adjusted Assets	If 1987 <= fiscal year <= 1997 and pcppao > 0, use Total assets (at) + DB assets + Operating lease - Prepaid pension cost (pcppao) - Underfunded prepaid pension cost (pcppau) If 1998 <= fiscal year <= 2006 and pcppao > 0, use Total assets (at) + DB assets + Operating lease - Prepaid pension cost (pcppao) If 2007 <= fiscal year and funded status > 0, use Total assets (at) + DB assets + Operating lease - Funded status (pcppao)
Adjusted Liabilities	If 1987 <= fiscal year <= 1997 and pcppao < 0, use Total liabilities (lt) + DB liabilities + Operating lease - abs(Accrued pension cost (pcppao)) - abs(Underfunded accrued pension cost (pcppau)) If 1998 <= fiscal year <= 2006 and pcppao < 0, use Total liabilities (lt) + DB liabilities + Operating lease - abs(Accrued pension cost (pcppao)) If 2007 <= fiscal year and funded status < 0, use Total liabilities (lt) + DB liabilities + Operating lease - abs(Funded status (pcppao))
Asset Tangibility	Net property, plant, and equipment (ppent) / Adjusted Assets
Bankrupt	Dummy = 1 if a firm files for Chapter 11 bankruptcy in a given year, and 0 otherwise
BV Equity	Stockholders' equity (seq or ceq + pstk or at - lt) + Taxes and investment tax credit (txdb+itcb) - Book value of preferred stock (pstkrv or pstkl or pstk)
Cash Holdings	Cash and short-term investments (che) / Adjusted Assets
CF Volatility	Standard deviation of quarterly operating income (oibdpq) over previous 12 quarters scaled by adjusted assets
DB Assets (PPA)	If 1987 <= fiscal year <= 1997, Pension plan assets (pplao) + Underfunded pension plan assets (pplau) If fiscal year >= 1998, Pension plan assets (pplao)
DB Liabilities (PBO)	If 1987 <= fiscal year <= 1997, Pension benefit projected obligation (pbpro) + Underfunded pension benefit projected obligation (pbpru) If fiscal year >= 1998, Pension benefit projected obligation (pbpro)
DB Pension Sponsor	Dummy = 1 if a firm sponsors a DB pension plan, and 0 otherwise
Dividend Payer	Dummy = 1 if common stock dividends (dvc) are positive, and 0 otherwise
Leverage	(Short-term liabilities (dlc) + long-term debt (dltt)) / Adjusted Assets
Market-to-Book	[Adjusted Assets - BV equity + MV equity (prcc_f*csho)] / Adjusted Assets
No S&P Credit Rating	Dummy = 1 if a firm does not have a credit rating, and 0 otherwise
Operating Leases	Rental expense (xrent) × 10, as in Rampini and Viswanathan (2013)
Return on Assets	Operating income before depreciation (oibdp) / Adjusted Assets
R&D	Research and development expenses (xrd) / Adjusted Assets
S&P Credit Rating	A numeric variable between 0 and 1 indicating a firm's credit rating, with 0.042 corresponding to a D rating, 0.929 corresponding to a AAA rating, and each rating increment increasing the firm's rating with 0.042, as in Rauh (2009)

Table 2.2: Descriptive Statistics

This table reports descriptive statistics for the sample of 481 Compustat defined benefit pension sponsors over the period from 1987 to 2012 which meet the original BRD sampling criteria: (i) have assets worth $100 million or more, measured in 1980 dollars, and (ii) file Form 10-K with the Securities and Exchange Commission (SEC) not less than three years prior to the bankruptcy case, . The 244 bankrupt defined benefit sponsors in the sample are matched to 237 non-bankrupt defined benefit sponsors on industry, year, and size.

Panel A: Industry Distribution

This panel presents an industry break-down for the sample firms, including the industry name, the number of firms in that industry, and the percent of firms in the industry relative to the 481 sample firms. Industry affiliation is determined using the Fama and French 48-industry classification. Industries are ranked from highest representation in the sample to lowest.

Industry	N	%	Industry	N	%
Retail	73	15%	Construction	10	2%
Transportation	38	8%	Fabricated Products	10	2%
Steel Works	34	7%	Electrical Equipment	10	2%
Autos/Trucks	30	6%	Petroleum/Gas	6	1%
Textiles	27	6%	Computers	6	1%
Consumer Goods	22	5%	Electronic Equip	6	1%
Apparel	22	5%	Coal	4	1%
Chemicals	22	5%	Personal Services	4	1%
Machinery	22	5%	Other	4	1%
Rubber/Plastic Prdcts	18	4%	Recreation	2	0%
Business Services	18	4%	Healthcare	2	0%
Business Supplies	18	4%	Non-Metallic Mining	2	0%
Printing and Publishing	14	3%	Measuring/Control Equip	2	0%
Construction Mtrls	14	3%	Shipping Containers	2	0%
Wholesale	14	3%			
Food Products	12	3%			
Entertainment	12	3%	All	481	100%

Panel B: Summary Statistics

This panel presents summary statistics for the main sample of 481 Compustat defined benefit pension sponsors from 1987 to 2012. The first four columns under the heading *All DB Sponsors* report summary statistics for all 481 sponsors in the sample. The next four columns under the heading *Bankrupt DB Sponsors* report summary statistics for the set of 244 bankrupt defined benefit sponsors. The last four columns under the heading *Matched Non-Bankrupt DB Sponsors* report summary statistics for the sample of 237 non-bankrupt defined benefit sponsors. All variables are defined in Table 2.1. All dollar values are expressed in constant 1987 dollars. All continuous variables are winsorized at 0.5% in each tail to reduce the impact of outliers. Test statistics of the t-test and the Wilcoxon-test of the differences in firm and pension plan characteristics between bankrupt and non-bankrupt defined benefit sponsors are given in superscript and denote statistical significance of the difference at the 1%(***), 5%(**), and 10%(*) levels, respectively.

	All DB Sponsors				Bankrupt DB Sponsors				Matched Non-Bankrupt DB Sponsors			
	N	Mean	Median	Stdev	N	Mean	Median	Stdev	N	Mean	Median	Stdev
Assets	481	1,914	510.8	5,759	244	1,757	492.8	5,584	237	2,075	533.8	5,941
Adjusted Assets	481	2,235	584.0	6,891	244	2,144	545.9	6,884	237	2,330	593.0	6,912
Ln(Adjusted Assets)	481	6.868	6.596	1.180	244	6.844	6.573	1.179	237	6.892	6.626	1.184
Asset Tangibility	481	0.356	0.331	0.197	244	0.353	0.337	0.195	237	0.359	0.326	0.199
Return on Assets	481	0.086	0.089	0.079	244	0.046	0.051	0.068	237	0.127***	0.126***	0.069
Cash Holdings	481	0.065	0.033	0.078	244	0.058	0.032	0.066	237	0.072**	0.035	0.089
Cash Flow Volatility	481	0.016	0.012	0.013	244	0.019	0.015	0.014	237	0.013***	0.010***	0.011
Market-to-Book	481	1.378	1.157	0.746	244	1.273	1.104	0.598	237	1.485**	1.202**	0.860
R&D	481	0.009	0	0.022	244	0.008	0	0.022	237	0.010	0	0.021
Dividend Payer	481	0.370	0	0.483	244	0.164	0	0.371	237	0.582***	1	0.494
S&P Credit Rating	481	0.188	0	0.235	244	0.129	0	0.171	237	0.249***	0***	0.273
No S&P Credit Rating	481	0.509	1	0.500	244	0.504	1	0.501	237	0.515	1	0.501
Oper. Leases / Adj. Assets	452	0.298	0.171	0.337	228	0.337	0.195	0.358	224	0.258***	0.141***	0.310
DB Pension Sponsor	481	1	1	0	244	1	1	0	237	1	1	0
DB Assets / Adj. Assets	481	0.155	0.090	0.193	244	0.178	0.096	0.211	237	0.132**	0.079**	0.170
DB Liab. / Adj. Assets	481	0.181	0.098	0.219	244	0.219	0.121	0.252	237	0.142***	0.082**	0.172
Funding status	463	-0.112	-0.126	0.354	237	-0.155	-0.161	0.288	226	-0.067***	-0.105***	0.408
Funding dummy	481	0.270	0	0.445	244	0.234	0	0.424	237	0.308*	0*	0.463
DB Liab. / Adj. Liab	481	0.138	0.096	0.134	244	0.133	0.087	0.133	237	0.143	0.100	0.136
Leverage	481	0.359	0.347	0.240	244	0.418	0.418	0.272	237	0.298***	0.291***	0.185
Additional Leverage	481	0.894	0.704	0.568	244	1.107	1.014	0.623	237	0.675***	0.590***	0.403
Bankrupt	481	0.507	1	0.500	244	1	1	0	237	0	0	0

Panel C:: Pairwise Correlation

This panel reports pairwise correlation coefficients among the main variables of interest for the sample of 481 Compustat defined benefit pension sponsors from 1987 to 2012. All variables are defined in Table 2.1. *p-values* are reported in brackets.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Bankrupt	1.00													
2	DB Liabilities / Adj. Liabilities	-0.04	1.00												
		(0.41)													
3	Leverage	0.25	-0.23	1.00											
		(0.00)	(0.00)												
4	Additional Leverage	0.38	0.25	-0.25	1.00										
		(0.00)	(0.00)	(0.00)											
5	Ln (Adj.Assets)	-0.02	0.08	-0.08	0.21	1.00									
		(0.66)	(0.09)	(0.08)	(0.00)										
6	Cash Holdings	-0.09	0.07	-0.33	0.18	0.04	1.00								
		(0.04)	(0.13)	(0.00)	(0.00)	(0.38)									
7	Cash Flow Volatility	0.22	-0.10	0.04	0.15	-0.21	0.10	1.00							
		(0.00)	(0.02)	(0.41)	(0.00)	(0.00)	(0.03)								
8	Asset Tangibility	-0.02	-0.04	0.07	0.00	0.17	-0.22	-0.15	1.00						
		(0.71)	(0.36)	(0.10)	(0.98)	(0.00)	(0.00)	(0.00)							
9	Return on Assets	-0.51	-0.11	-0.02	-0.30	0.02	-0.06	-0.22	0.03	1.00					
		(0.00)	(0.01)	(0.69)	(0.00)	(0.66)	(0.21)	(0.00)	(0.46)						
10	Market-to-Book	-0.14	-0.02	-0.06	0.18	0.03	0.23	0.08	-0.14	0.39	1.00				
		(0.00)	(0.61)	(0.17)	(0.00)	(0.51)	(0.00)	(0.09)	(0.00)	(0.00)					
11	Dividend Payer	-0.43	0.05	-0.19	-0.29	0.15	-0.04	-0.20	0.02	0.31	0.01	1.00			
		(0.00)	(0.32)	(0.00)	(0.00)	(0.00)	(0.40)	(0.00)	(0.74)	(0.00)	(0.80)				
12	R&D	-0.05	0.08	-0.00	-0.07	-0.02	0.15	0.07	-0.18	-0.02	0.13	-0.05	1.00		
		(0.32)	(0.07)	(0.93)	(0.12)	(0.65)	(0.00)	(0.15)	(0.00)	(0.70)	(0.01)	(0.26)			
13	S&P Credit Rating	-0.26	-0.04	0.17	-0.20	0.42	-0.11	-0.17	0.13	0.24	0.05	0.23	-0.01	1.00	
		(0.00)	(0.39)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.47)	(0.00)	(0.29)	(0.00)	(0.90)		
14	No S&P Credit Rating	-0.01	0.05	-0.24	0.01	-0.42	0.07	0.14	-0.10	-0.07	-0.02	-0.04	0.01	-0.82	1.00
		(0.82)	(0.23)	(0.00)	(0.75)	(0.00)	(0.11)	(0.00)	(0.03)	(0.13)	(0.74)	(0.38)	(0.78)	(0.00)	

Table 2.3: Determinants of Chapter 11 Likelihood

This table reports regression results on the role of defined benefit claimants on the likelihood of Chapter 11 filing for 481 defined benefit sponsors from 1987 to 2012. Bankrupt defined benefit sponsors are matched to non-bankrupt defined benefit firms in the same year, industry and closest in size. Columns (1) and (2) report the marginal effects from a logistic regression whereas columns (3) and (4) present coefficients from a linear probability model. All variables are defined in Table 2.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the year level.

Dependent Variable: $Bankrupt_{it}$	(1)	(2)	(3)	(4)
DB Liabilities / Adj. Liabilities	-0.31**	-0.23**	-0.30**	-0.25**
	(-2.39)	(-2.46)	(-2.37)	(-2.22)
Leverage	0.76***	0.44***	0.74***	0.48***
	(8.14)	(5.60)	(7.76)	(5.24)
Additional Leverage	0.47***	0.22***	0.43***	0.23***
	(13.21)	(5.63)	(11.27)	(5.57)
Cash Holdings		-0.71**		-0.69***
		(-2.55)		(-2.89)
Cash Flow Volatility		1.27		2.01
		(0.86)		(1.44)
Asset Tangibility		-0.10*		-0.17**
		(-1.75)		(-2.45)
Return on Assets		-1.75***		-1.93***
		(-6.65)		(-7.79)
Market-to-Book		-0.01		-0.02
		(-0.38)		(-0.86)
Dividend Payer		-0.08**		-0.13***
		(-2.42)		(-3.67)
R&D		-0.55		-1.04
		(-0.64)		(-1.14)
S&P Credit Rating		-0.99***		-0.86***
		(-7.13)		(-9.34)
No S&P Credit Rating		-0.33***		-0.32***
		(-6.86)		(-5.80)
Intercept			-0.10*	0.83***
			(-1.87)	(7.99)
Model	Logit	Logit	LPM	LPM
N	481	481	481	481
R-squared	0.25	0.50	0.28	0.51

Table 2.4: Descriptive Statistics for Sample of All Compustat Firms

This panel reports descriptive statistics for the sample of all Compustat firms over the period from 1987 to 2012 which meet the original BRD sampling criteria: (i) have assets worth $100 million or more, measured in 1980 dollars, and (ii) file Form 10-K with the Securities and Exchange Commission (SEC) not less than three years prior to the bankruptcy case, .

Panel A: Industry Distribution

This panel presents an industry break-down for all Compustat firms from 1987 to 2012. The first three columns under the heading *Non-Defined Benefit Firms* report the industry affiliation for all Compustat firms without defined benefit plans. The next three columns under the heading *Defined Benefit Sponsors* report the industry affiliation of all Compustat firms with defined benefit plans. The last three columns under the heading *Bankruptcies* present the industry affiliation for all Chapter 11 bankruptcies among Compustat firms. Industry affiliation is determined using Fama and French's 48-industry classification. Industries are ranked from highest to lowest in terms of the number of firms that contribute to each sample.

Non-Defined Benefit Firms			Defined Benefit Sponsors			Bankruptcies		
Industry	N	%	Industry	N	%	Industry	N	%
Business Services	3369	16%	Machinery	1405	7%	Retail	66	14%
Retail	2421	12%	Retail	1396	7%	Transportation	34	7%
Petroleum/Gas	1484	7%	Chemicals	1290	6%	Business Services	32	7%
Electronic Equip	1465	7%	Business Services	1056	5%	Wholesale	30	7%
Computers	1246	6%	Petroleum/Gas	1056	5%	Entertainment	21	5%
Wholesale	1193	6%	Wholesale	1052	5%	Steel Works	20	4%
Transportation	944	5%	Steel Works	943	5%	Construction	19	4%
Pharmaceutical Prdcts	832	4%	Transportation	926	5%	Petroleum/Gas	18	4%
Healthcare	825	4%	Electronic Equip	869	4%	Autos/Trucks	17	4%
Restaurants/Hotels	766	4%	Business Supplies	842	4%	Textiles	15	3%
Entertainment	758	4%	Construction Mtrls	819	4%	Construction Mtrls	14	3%
Construction	624	3%	Food Products	776	4%	Healthcare	13	3%
Personal Services	462	2%	Autos/Trucks	720	4%	Chemicals	13	3%
Medical Equipment	409	2%	Consumer Goods	649	3%	Personal Services	13	3%
Apparel	378	2%	Printing and Publishing	527	3%	Computers	13	3%
Machinery	339	2%	Electrical Equipment	497	2%	Consumer Goods	12	3%
Other	327	2%	Pharmaceutical Prdcts	461	2%	Apparel	12	3%
Measuring/Control Equip	305	1%	Medical Equipment	432	2%	Business Supplies	12	3%
Consumer Goods	287	1%	Computers	421	2%	Other	12	3%
			omitted					
All	20679	100%	All	20546	100%	All	461	100%

Panel B: Summary Statistics

This panel reports summary statistics for the sample of all Compustat firms from 1987 to 2012. The first four columns under the heading *All Compustat Firms* report summary statistics for the full sample of Compustat firms. The next four columns under the heading *Defined Benefit Sponsors* report summary statistics for all Compustat defined benefit sponsors. The last four columns under the heading *Non-Defined Benefit Firms* report summary statistics for all Compustat firms without defined benefit plans. All variables are defined in Table 2.1. All dollar values are expressed in constant 1987 dollars. All continuous variables are winsorized at 0.5% in each tail to reduce the impact of outliers. Test statistics of the t-test and the Wilcoxon-test of the differences in firm and pension plan characteristics between defined benefit sponsors and firms without a pension plan are given in superscript and denote statistical significance of the difference at the 1%(***), 5%(**), and 10%(*) levels, respectively.

	All Compustat Firms				Defined Benefit Sponsors				Non-Defined Benefit Firms			
	N	Mean	Median	Stdev	N	Mean	Median	Stdev	N	Mean	Median	Stdev
Assets	41225	2,087	568.6	4,614	20546	3,133***	962.4***	5,778	20679	1,049	388.6	2,665
Adjusted Assets	41225	2,332	600.3	5256	20546	3,615***	1074***	6666	20679	1,057	388.6	2769
Asset Tangibility	41225	0.320	0.261	0.237	20546	0.332***	0.292***	0.205	20679	0.308	0.216	0.264
Return on Assets	41225	0.131	0.130	0.092	20546	0.138***	0.133***	0.073	20679	0.124	0.125	0.107
Cash Holdings	41225	0.124	0.061	0.154	20546	0.081***	0.046***	0.096	20679	0.166	0.089	0.186
Cash Flow Volatility	41225	0.016	0.010	0.019	20546	0.013***	0.009***	0.012	20679	0.019	0.012	0.023
Market-to-Book	41225	2.078	1.548	1.736	20546	1.813***	1.457***	1.192	20679	2.342	1.675	2.112
R&D	41225	0.024	0	0.046	20546	0.017***	0.001***	0.031	20679	0.031	0	0.056
Dividend Payer	41225	0.464	0	0.499	20546	0.647***	1***	0.478	20679	0.283	0	0.451
S&P Credit Rating	41225	0.241	0	0.281	20546	0.333***	0.422***	0.299	20679	0.150	0	0.228
No S&P Credit Rating	41225	0.540	1	0.498	20546	0.406***	0***	0.491	20679	0.673	1	0.469
Operating Leases	37720	0.275	0.140	0.435	18675	0.226***	0.131***	0.307	19045	0.324	0.155	0.526
DB Pension Sponsor	41225	0.498	0	0.500	20546	1	1	0	20679	0	0	0
DB Assets / Assets	20604	0.147	0.090	0.172	20103	0.150	0.093	0.172	0	0	0	0
DB Liab. / Assets	20604	0.157	0.099	0.177	20218	0.160	0.103	0.177	0	0	0	0
DB Liab. / Adj. Liab	41225	0.077	0	0.120	20546	0.154	0.119	0.131	20679	0	0	0
Leverage	41225	0.273	0.252	0.212	20546	0.288***	0.266***	0.187	20679	0.259	0.227	0.234
Additional Leverage	41225	0.605	0.497	0.438	20546	0.677***	0.582***	0.399	20679	0.534	0.390	0.464
Bankrupt	41225	0.011	0	0.105	20546	0.007***	0***	0.084	20679	0.015	0	0.123

Table 2.5: Determinants of Chapter 11 Likelihood for All Compustat Firms: Pension Sponsors

This table reports regression results for the role of defined benefit claimants on the likelihood of Chapter 11 filing in the sample of all Compustat firms from 1987 to 2012. Columns (1) through (3) report marginal effects from a logistic regression, columns (4) through (6) report coefficients from a linear probability model, and columns (7) through (9) report coefficients from a conditional logistic regression. All variables are defined in Table 2.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the year level.

Dependent Variable: $Bankrupt_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DB Pension Sponsor	-0.01***	-0.01***	-0.01***	-0.01***	-0.02***	-0.01***	-0.72***	-0.87***	-0.56***
	(-8.50)	(-9.92)	(-5.45)	(-5.25)	(-6.56)	(-5.23)	(-8.28)	(-10.23)	(-5.07)
Leverage		0.04***	0.02***		0.05***	0.02***		3.14***	2.01***
		(19.82)	(10.13)		(7.43)	(4.84)		(22.64)	(10.33)
Additional Leverage		0.02***	0.01***		0.03***	0.03***		1.23***	1.13***
		(17.33)	(10.95)		(8.38)	(8.33)		(14.52)	(8.91)
Size			-0.00			0.00**			-0.10
			(-0.30)			(2.14)			(-1.37)
Cash Holdings			-0.04***			-0.03***			-4.66***
			(-5.27)			(-4.69)			(-6.40)
Cash Flow Volatility			-0.02			0.07			-4.43*
			(-0.67)			(1.62)			(-1.76)
Asset Tangibility			0.01**			0.02***			-0.05
			(2.07)			(3.35)			(-0.20)
Return on Assets			-0.08***			-0.12***			-8.29***
			(-10.27)			(-7.16)			(-10.00)
Market-to-Book			-0.00***			0.00**			-0.37***
			(-2.79)			(2.73)			(-2.89)
Dividend Payer			-0.01***			-0.01***			-1.00***
			(-6.33)			(-3.59)			(-5.19)
R&D			-0.03			-0.05			-3.41
			(-1.09)			(-1.66)			(-1.33)
S&P Credit Rating			-0.11***			-0.09***			-10.83***
			(-15.29)			(-4.21)			(-15.44)
No S&P Credit Rating			-0.04***			-0.04***			-3.64***
			(-18.58)			(-3.89)			(-16.81)
Intercept				0.01	-0.02**	0.03**			
				(1.11)	(-2.25)	(2.19)			
Model	Logit	Logit	Logit	LPM	LPM	LPM	CLogit	CLogit	CLogit
N	38,159	38,159	38,159	41,225	41,225	41,225	41,225	41,225	41,225
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
R-squared	0.09	0.18	0.36	0.01	0.03	0.05	0.01	0.12	0.32

Table 2.6: Determinants of Chapter 11 Likelihood for All Compustat Firms: Pension Liabilities

This table reports regression results for the role of defined benefit claimants on the likelihood of Chapter 11 filing for the sample of all Compustat firms from 1987 to 2012. Columns (1) and (2) report marginal effects from a logistic regression, columns (3) and (4) report coefficients from a linear probability model, and columns (5) and (6) report coefficients from a conditional logistic regression. All variables are defined in Table 2.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the year level.

Dependent Variable: $Bankrupt_{it}$	(1)	(2)	(3)	(4)	(5)	(6)
DB Pension Sponsor	-0.01***	-0.01***	-0.01***	-0.01***	-0.67***	-0.32**
	(-6.10)	(-3.35)	(-5.63)	(-4.48)	(-5.55)	(-2.28)
(DB Liab/Adj. Liab) * DB Sponsor	-0.04***	-0.04***	-0.04***	-0.03***	-1.41*	-1.89**
	(-4.13)	(-4.01)	(-5.55)	(-4.44)	(-1.92)	(-2.14)
Leverage	0.03***	0.02***	0.05***	0.02***	3.09***	1.94***
	(18.75)	(9.14)	(7.27)	(4.54)	(22.74)	(9.65)
Additional Leverage	0.02***	0.01***	0.03***	0.03***	1.24***	1.15***
	(16.86)	(11.30)	(8.56)	(8.51)	(14.64)	(9.16)
Size		-0.00		0.00**		-0.10
		(-0.01)		(2.18)		(-1.37)
Cash Holdings		-0.04***		-0.03***		-4.79***
		(-5.39)		(-4.76)		(-6.43)
Cash Flow Volatility		-0.02		0.07		-4.80*
		(-0.78)		(1.58)		(-1.89)
Asset Tangibility		0.01**		0.02***		-0.03
		(2.13)		(3.48)		(-0.13)
Return on Assets		-0.08***		-0.12***		-8.42***
		(-10.27)		(-7.20)		(-9.78)
Market-to-Book		-0.00***		0.00**		-0.37***
		(-2.87)		(2.75)		(-2.90)
Dividend Payer		-0.01***		-0.01***		-0.96***
		(-6.04)		(-3.26)		(-4.91)
R&D		-0.03		-0.05*		-3.16
		(-0.97)		(-1.71)		(-1.26)
S&P Credit Rating		-0.11***		-0.09***		-10.92***
		(-14.73)		(-4.17)		(-15.09)
No S&P Credit Rating		-0.04***		-0.04***		-3.69***
		(-17.46)		(-3.84)		(-16.51)
Intercept			-0.02**	0.02*		
			(-2.43)	(2.04)		
Model	Logit	Logit	LPM	LPM	CLogit	CLogit
N	38,159	38,159	41,225	41,225	41,225	41,225
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	No	No
R-squared	0.19	0.37	0.03	0.05	0.12	0.32

Table 2.7: Determinants of Chapter 11 Likelihood for Underfunded Plans

This table reports regression results for the role of defined benefit claimants on the likelihood of Chapter 11 filing for the 351 defined benefit sponsors with underfunded pension plans from 1987 to 2012. In an underfunded defined benefit plan, pension liabilities exceed pension assets. Columns (1) and (2) report marginal effects from a logistic regression whereas columns (3) and (4) report coefficients from a linear probability model. All variables are defined in Table 2.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the year level.

Dependent Variable: $Bankrupt_{it}$	(1)	(2)	(3)	(4)
DB Liabilities / Adj. Liabilities	-0.26*	-0.25**	-0.27*	-0.25*
	(-1.78)	(-2.08)	(-1.77)	(-1.84)
Leverage	0.73***	0.43***	0.69***	0.48***
	(5.95)	(4.45)	(5.60)	(4.56)
Additional Leverage	0.47***	0.24***	0.42***	0.22***
	(11.12)	(4.55)	(10.25)	(4.57)
Cash Holdings		-0.95***		-0.87***
		(-2.62)		(-3.02)
Cash Flow Volatility		1.07		2.07
		(0.72)		(1.49)
Asset Tangibility		-0.10		-0.20**
		(-1.26)		(-2.38)
Return on Assets		-1.68***		-1.87***
		(-5.67)		(-6.22)
Market-to-Book		-0.01		-0.02
		(-0.31)		(-0.78)
Dividend Payer		-0.09*		-0.15***
		(-1.89)		(-3.50)
R&D		-0.43		-1.31
		(-0.42)		(-1.41)
S&P Credit Rating		-1.25***		-1.03***
		(-5.32)		(-8.59)
No S&P Credit Rating		-0.36***		-0.36***
		(-6.47)		(-5.06)
Intercept			-0.07	0.92***
			(-0.99)	(7.28)
Model	Logit	Logit	LPM	LPM
N	351	351	351	351
R-squared	0.23	0.50	0.26	0.50

Table 2.8: Determinants of Chapter 11 Likelihood Under ABO

This table reports regression results for the role of defined benefit claimants on the likelihood of Chapter 11 filing for all Compustat firms from 1987 to 2012. In this table, defined benefit liabilities are estimated using an alternative measure of liabilities, the accumulated benefit obligation (ABO). Columns (1) and (2) report marginal effects from a logistic regression, columns (3) and (4) report coefficients from a linear probability model, and columns (5) and (6) report coefficients from a conditional logistic regression. All variables are defined in Table 2.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the year level.

Dependent Variable: $Bankrupt_{it}$	(1)	(2)	(3)	(4)
(ABO Liab/Adj. Liab) * ABO Sponsor	-0.02**	-0.02**	-0.03***	-0.03***
	(-2.04)	(-2.48)	(-5.48)	(-5.07)
ABO Pension Sponsor	-0.01***	-0.00	-0.01***	-0.00**
	(-3.29)	(-1.34)	(-4.09)	(-2.21)
Leverage	0.03***	0.02***	0.05***	0.02***
	(17.56)	(7.96)	(7.19)	(3.82)
Additional Leverage (ABO)	0.01***	0.01***	0.02***	0.02***
	(11.92)	(8.09)	(8.85)	(9.00)
Size		-0.00		0.00*
		(-0.84)		(1.72)
Cash Holdings		-0.04***		-0.03***
		(-5.30)		(-4.85)
Cash Flow Volatility		-0.01		0.08*
		(-0.32)		(1.88)
Asset Tangibility		0.01**		0.02***
		(2.33)		(3.56)
Return on Assets		-0.08***		-0.12***
		(-11.57)		(-7.28)
Market-to-Book		-0.00***		0.00***
		(-2.65)		(2.85)
Dividend Payer		-0.01***		-0.01***
		(-6.82)		(-3.83)
R&D		-0.03		-0.04
		(-0.88)		(-1.46)
S&P Credit Rating		-0.11***		-0.09***
		(-15.36)		(-4.21)
No S&P Credit Rating		-0.04***		-0.04***
		(-17.53)		(-3.95)
Intercept			-0.02**	0.03**
			(-2.30)	(2.57)
Model	Logit	Logit	LPM	LPM
N	38,171	38,171	41,238	41,238
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R-squared	0.15	0.35	0.03	0.05

Chapter 3

Corporate Defined Benefit Pension Plans in Bankruptcy Reorganization

3.1 Introduction

Corporate defined benefit pension plans hold a claim against the firm's assets in bankruptcy. However, little is known about what role defined benefit claimants play in the bargaining among claimants in bankruptcy and the outcomes of the reorganization process, if any. The main goal of this essay is to determine whether pension claimants influence the restructuring process under Chapter 11. In bankruptcy, defined benefit plans typically become members of the unsecured creditors' committee and can vote on the proposed plan of reorganization[27]. Therefore, pension claimants will play some role in bankruptcy because they are unsecured creditors with voting power. Rather than capturing this mechanical effect, I am interested in whether pension claimants influence the reorganization process above and beyond the traditional lenders' influence. Whether defined benefit claimants should play a role above that of other creditors is a priori unclear.

On the one hand, defined benefit claimants may influence the bankruptcy restructuring more than other lenders because pension claimants are different from the firm's traditional creditors. In particular, pension claimants are less diversi-

[27] Defined benefit claimants get a vote in bankruptcy proportional to the unfunded portion of their obligation.

fied and stand to lose more than other lenders in bankruptcy so they have strong incentives to influence the Chapter 11 process beyond what traditional creditors would do[28]. On the other hand, defined benefit claimants may not influence the bankruptcy restructuring more than other firm lenders if they have already given up a lot in private negotiations prior to bankruptcy, if their claim is not sizable relative to that of the other unsecured creditors, or if it is in their best interest not to do so.

To understand whether defined benefit claimants influence the bankruptcy process beyond the impact of traditional creditors, I use a comprehensive sample of 236 bankrupt defined benefit pension sponsors from 1987 to 2012. I control for the role of traditional lenders in bankruptcy by accounting for the firm's overall indebtedness and I capture any additional effect that pension claimants may have relative to all other claimants with the ratio of defined benefit liabilities to overall liabilities. By controlling for firms' overall indebtedness and focusing on the composition of firm lenders, I am able to investigate the incremental impact that defined benefit claimants have beyond other lenders on the reorganization process and its outcomes.

I present novel evidence on the role of defined benefit claimants in bankruptcy. First, pension claimants do not influence the time firms spend reorganizing or the likelihood that firms emerge from bankruptcy more than other creditors. However, defined benefit claimants impact the decision to terminate a pension plan in bankruptcy. In particular, firms are more likely to terminate a pension plan in bankruptcy whenever defined benefit obligations represent a higher proportion of the firm's overall liabilities. This effect is significant and robust to different specifications. The strong association between defined benefit obligations and distressed plan terminations implies a role for defined benefit claimants above and beyond the influence of the firm's other lenders.

Next, I examine the extent to which defined benefit claimants and the actions they take in bankruptcy predict the post-reorganization firm survival as measured

[28]For example, consider a hedge fund, such as Bridgewater Associates or BlackRock, whose portfolio is well diversified. To these creditors, one company's bankruptcy will likely not have a material impact on the fund's financial position. In contrast, defined benefit claimants stand to lose a sizable portion of their wealth upon their employer's bankruptcy because their jobs, salaries, and pensions are dependent on the company's performance.

by the likelihood that firms refile for Chapter 11. I document that the more defined benefit obligations contribute to the firm's overall liabilities, the less likely the firm is to refile for bankruptcy. These results provide further support for the findings in the previous chapter that firms with more defined benefit claimants relative to other lenders are less likely to file for Chapter 11.

If defined benefit claimants play a role beyond that of traditional lenders, they may influence unsecured creditors' recovery rates because pension claimants themselves are typically unsecured creditors in bankruptcy. In a subsample of firms with recovery data, I show that defined benefit claimants impact the recovery rates for unsecured creditors. In particular, a higher ratio of pension liabilities to overall liabilities is associated with higher recovery rates for unsecured creditors. While the effect is marginally significant, it suggests that defined benefit claimants may play a role in bankruptcy beyond the influence of traditional lenders.

In light of the evidence that defined benefit claimants impact some aspects of the restructuring process beyond the influence of traditional lenders, I next consider one potential channel through which pension claimants may impact Chapter 11 reorganization: bargaining about their pension benefits. In particular, if defined benefit claimants influence bankruptcy restructuring through accepting benefit cuts, their role will be evident in explaining extra variation in these benefit cuts beyond what is expected in bankruptcy. After controlling for the creditors' expected losses in Chapter 11, I show that defined benefit claimants influence the changes in their liabilities in bankruptcy. This effect is present only for the unfunded portion of pension liabilities relative to all firm liabilities. Thus, pension claimants agree to concessions whenever they stand to lose the most.

While not the main focus of the essay, the results in this paper provide novel evidence that unions facilitate negotiations between creditors in bankruptcy. Firms whose employees are represented by unions reorganize faster under Chapter 11 bankruptcy. In particular, switching from not having union representation to having unions is associated with a 26% reduction in the time firms spend in bankruptcy. Moreover, unions are positively related to the likelihood that firms reorganize successfully under Chapter 11 bankruptcy. These findings indicate a role for unions in aiding the bankruptcy reorganization process.

My paper contributes to the literature on the outcomes of Chapter 11 bankruptcy.

Several studies have examined the factors influencing the time spent in bankruptcy and the probability that a firm successfully emerges from Chapter 11. Hotchkiss (1993) shows that firm size is the most important characteristic of emergence. Bryan, Tiras, and Wheatley (2002) document that solvency risk and liquidity risk matter for the likelihood of bankruptcy emergence. Denis and Rodgers (2007) show that the duration, the outcome, and the post-reorganization process after Chapter 11 are related to firms' operating and financial characteristics. This essay contributes to the literature by showing how defined benefit claimants influence the bankruptcy restructuring process. In terms of accounting for alternative firm lenders, prior studies have considered how the resolution of bankruptcy is impacted by debtor-in-possession financing (Dahiya, John, Puri, and Ramirez, 2003), private equity firms (Hotchkiss et al., 2012), and hedge funds (Jiang et al., 2012). My study contributes to these works by showing that defined benefit claimants play a role in the resolution of bankruptcy beyond that of traditional lenders.

My paper is also related to the literature on the determinants of defined benefit plan terminations. Most papers in this literature focus on a firm's decision to terminate its overfunded defined benefit plans outside of bankruptcy (Mittelstaedt and Regier, 1993; Stone, 1987; Thomas, 1989)[29]. Ippolito (1985a) is one of the first papers to study the determinants of underfunded plan terminations at the firm level. Rauh (2009) provides a more recent analysis of bankrupt firms' defined benefit plan terminations at the plan level. I extend Rauh (2009)'s findings to show that defined benefit claimants impact the decision to terminate the pension plan through the size of their obligation relative to the firm's overall indebtedness. Thus, my study documents an important role for defined benefit claimants in Chapter 11 bankruptcy.

The rest of the paper is organized as follows. Section 3.2 discusses the role of defined benefit claimants in bankruptcy and develops the hypotheses under study. Section 3.3 describes the data and presents summary statistics. Sections 3.5 to 3.9 present results for the Chapter 11 outcomes under study. Section 3.10 concludes.

[29]In addition, Petersen (1992) provides a thorough analysis of firms' financial, tax, and implicit contract motives to terminate overfunded pension plans.

3.2 Defined Benefit Claimants in Bankruptcy

In Chapter 11, distressed firms are given a chance to restructure their operations without pressure from creditors. Firms have 120 days from filing for bankruptcy to come up with a reorganization plan that outlines the actions needed to be taken to emerge from bankruptcy, including how much of their pre-bankruptcy claim different claimants will recover upon emergence. Claimants whose positions are impaired are allowed to vote on the proposed plan and their voting power is usually proportionate to their claims' size. While the firm drafts the reorganization plan, it negotiates with different claimants on the plan's acceptable terms. These negotiations are needed to ensure the plan is approved by vital claimants[30]. The proposed plan can be amended in creditors express concerns and if the firm's plan is not approved, creditors are allowed to put their alternative plan for reorganization to a vote. Altogether, the Chapter 11 restructuring process involves extensive negotiations among the firm and its creditors. Different claimants participate differently in the negotiations that ensue in bankruptcy. While secured creditors usually recover their entire claim and equity claimants only receive what is left after all creditors are paid off, unsecured creditors fall in the middle of active negotiations with the firm to determine how much of their claim they will recover and what the bankruptcy outcomes will be. Defined benefit claimants are typically part of the unsecured creditors' committee and they participate in the bankruptcy negotiations[31].

The main goal of this paper is to determine whether defined benefit claimants influence the reorganization process under Chapter 11 bankruptcy. As members of the unsecured creditors' committee, pension claimants will play a role in bankruptcy simply because they have voting power. Instead of capturing this mechanical effect, I am interested in whether pension claimants influence the reorganization process above and beyond the traditional lenders' influence.

[30] An advantage of the bankruptcy process is the debtor's ability to bind individual creditors to a repayment plan despite their dissent. Under 11 U.S.C §§1129(a) and 1126(c), a plan may be confirmed as long as a sufficient number of creditors in a given class who hold a minimum amount of claims vote in favor of the plan.

[31] Note that the part of defined benefit obligations which is covered by pension assets is akin to a secured claim and the unfunded portion of pension obligations is an unsecured claim.

There are several reasons why defined benefit claimants may impact the reorganization process and its outcomes beyond the influence that traditional lenders have. First, the previous chapter of this thesis documented that defined benefit claimants are related to the likelihood that firms file for bankruptcy. If pension claimants matter for firm decisions prior to Chapter 11, they may also be relevant when the firm is in bankruptcy proceedings.

Second, defined benefit claimants differ from traditional lenders in bankruptcy[32]. While all unsecured creditors typically incur losses in bankruptcy, defined benefit claimants face higher losses than other unsecured lenders because pension claimants are less diversified than traditional creditors. For traditional lenders, the bankrupt firm is one of many investments so the losses these creditors incur will be at least partially offset by their other investments. Defined benefit claimants' pension wealth is entirely dependent on the bankrupt firm because the firm decides how to manage the plan and it controls all plan assets until employees retire. Moreover, even if firm creditors lose some portion of their investment in bankruptcy, they usually remain a creditor after emergence and have a chance to further recover their position. Defined benefit claimants may remain a creditor to the firm after bankruptcy, but they may also be removed as a creditor if their pension plan is terminated in Chapter 11 and their claim is transferred to the PBGC. Even further, defined benefit claimants are firm employees who stand to lose not only their pensions but also their jobs and future salaries. Overall, pension claimants are a unique member of the unsecured creditors' committee who is not as diversified and faces higher losses than the other unsecured creditors in bankruptcy. As a result, defined benefit claimants in Chapter 11 may influence the reorganization process beyond the influence of the firm's other lenders.

Last, pension claimants have a larger set of strategic actions they can undertake in bankruptcy to negotiate with the firm. In particular, pension claimants may accept benefit cuts or even benefit freezes for a certain period to keep the firm alive. Pension claimants may agree to freeze their defined benefit plan to new employees, thus reducing the share of employees covered by the plan. At the extreme,

[32]Appendix B at the end of the thesis provides a detailed description of employees rights in bankruptcy. Appendix C provides a more in-depth comparison of defined benefit claimants and the firm's other lenders than the one presented in the text.

defined benefit claimants may agree to have their plan terminated to keep the firm as a going concern and to preserve their jobs. In addition, defined benefit claimants may seek the help of the PBGC in the bankruptcy negotiations[33]. The PBGC has the same incentives as pension claimants to see the firm cover as much of the pension liability as possible. Moreover, the PBGC has expertise and experience in dealing with bankruptcy proceedings and may influence the bargaining between the firm and its creditors. Given these actions that pension claimants may undertake, defined benefit claimants may play a role beyond that of traditional lenders in bankruptcy.

While defined benefit claimants may differ from traditional lenders, these differences do not guarantee that pension claimants will impact the bankruptcy process beyond the influence that other lenders exert. One reason why pension claimants may not have a higher impact than traditional lenders is purely mechanical: if their claim is not large enough relative to the firm's other lenders, pension claimants will not have significant power to influence negotiations and the outcomes of bankruptcy.

In addition, defined benefit claimants may not have a stronger influence in Chapter 11 if they are unable to provide further concessions needed to impact the reorganization. In private negotiations prior to bankruptcy, pension claimants actively bargain with the firm and likely agree to wage and benefit cuts to prevent the firm from defaulting. Graham, Kim, Li, and Qiu (2013) provide evidence that employees agree to wage concessions prior to Chapter 11 so it is likely that pension benefits are also reduced prior to the bankruptcy filing. Once in Chapter 11, defined benefit claimants may not have any leeway to make further concessions beyond the cuts they accept prior to bankruptcy[34].

Yet another reason why defined benefit claimants may not exert an additional influence on the bankruptcy process could be because it is in their best interest to side with the rest of the unsecured lenders. If the firm does not fund the pension

[33] As previously noted, the PBGC stands for the Pension Benefit Guarantee Corporation, a government entity created under ERISA to protect corporate defined benefit pension plans.

[34] Defined benefit claimants may agree to concessions prior to Chapter 11 if they believe that these cuts will allow the firm to avoid bankruptcy. For example, prior to United Air Lines' bankruptcy in 2002, pension claimants agreed to $5 million in wage and benefit cuts over 5 years in hopes that these cuts would keep their employer solvent.

plan and invests its assets recklessly, defined benefit claimants will not take extra actions to aid the reorganization process beyond what the firm's other lenders are doing. Therefore, defined benefit claimants may choose not to play a role beyond that of traditional lenders in bankruptcy.

In light of these conflicting views, whether defined benefit claimants influence the reorganization process above and beyond the traditional lenders' impact remains an empirical question. To address this question, I control for the role of traditional creditors in bankruptcy and capture any additional effect that defined benefit claimants may have. The typical measures used in the literature to account for creditors' role in bankruptcy include firm leverage and the number of classes with a claim to the firm's assets. However, all liabilities are important in bankruptcy rather than just the traditional short-term liabilities and long-term debt which comprise the standard leverage measure. Since I am interested in the role of defined benefit claimants relative to that of all firm creditors, I control for the firm's overall indebtedness by accounting for short-term and long-term debt as well as for all other balance sheet liabilities and two of the largest off-balance sheet obligations: pension liabilities and operating leases.

To capture the role of pension claimants in bankruptcy, I use the ratio of defined benefit obligations to overall liabilities. This ratio proxies for pension claimants' influence on the bankruptcy reorganization process relative to that of the firm's other creditors. I account for the impact of the firm's traditional lenders by controlling for overall indebtedness and I measure how the composition of firm lenders, and pension claimants in particular, influences the restructuring process. In this way, I am able to investigate the incremental impact that defined benefit claimants have on the reorganization process beyond other lenders.

Following the above reasoning, my main tests focus on the following hypothesis:

Hypothesis H_0 **:** *Substituting a dollar of financial liabilities for a dollar of defined benefit pension liabilities does not impact the Chapter 11 restructuring process.*

In general, defined benefit claimants care about the total size of the pension promise. Once in bankruptcy, plan terminations become an imminent threat and pension claimants may also care about the part of their obligations which is not covered by assets, i.e. the unfunded portion of their obligation. Since pension plan assets in bankruptcy are an estate of the pension trust and cannot be accessed by the firm's other lenders, the portion of unfunded liabilities is more closely related to unsecured lenders' claims in Chapter 11. Therefore, the unfunded pension liabilities can be considered an alternative measure of defined benefit claimants' role in bankruptcy. In particular, the more underfunded the pension liability is, the more defined benefit claimants stand to lose, and hence, the higher the incentive will be for pension claimants to influence the restructuring. In light of this reasoning, I also test whether substituting a dollar of financial liabilities for a dollar of unfunded pension liabilities impacts the bankruptcy reorganization process.

Defined benefit claimants may influence various characteristics and outcomes of the reorganization process. Two common measures of bankruptcy restructuring include the length of time firms spend in Chapter 11 and the likelihood that firms successfully emerge from bankruptcy. Along with these measures, I also consider whether defined benefit claimants are related to the likelihood that firms terminate their pension plans in bankruptcy and to the likelihood that firms refile for Chapter 11 after having successfully reorganized once. If defined benefit claimants play a role in bankruptcy, their influence may be evident in the amounts that other creditors can recover. Therefore, I test for a relationship between unsecured creditors' recovery rates and the ratio of defined benefit obligations to overall liabilities.

As previously discussed, defined benefit claimants have a large set of strategic actions they can undertake to influence the bankruptcy process. These actions include negotiations with the firm, agreement to benefit cuts, and agreement to plan freezes, among others. Ideally, I would measure the specific actions that defined benefit claimants take over the course of the bankruptcy proceedings and compare them to the actions of traditional lenders. Then, I will be able to determine the channels through which pension claimants influence the reorganization process beyond other lenders' influence. However, some actions, such as negotiations, are hard to measure. Even further, few firms provide information during bankruptcy proceedings which makes it difficult to pin down the exact channel through which

defined benefit sponsors influence the outcomes of bankruptcy. Nevertheless, in a subsample of firms which provide restructuring information, I study one of the channels through which defined benefit claimants may influence the Chapter 11 bankruptcy process: their willingness to agree to pension benefit cuts.

3.3 Sample and Data

In this paper, I study the role of corporate defined benefit pension claimants in bankruptcy. My sample consists of all Chapter 11 filings by defined benefit sponsors from 1987 to 2012. The sample selection procedure is outlined in Panel A of Table 3.2. To construct the sample, I begin by identifying all firms that sponsor a defined benefit pension plan from the Compustat Pension Annual file. In the sample period, there are 8,874 pension plan sponsors (85,750 firm-year observations). Next, I identify all sponsors with non-missing data on pension assets and liabilities, which reduces the number of firms to 5,695. I merge the firm-year data for these remaining defined benefit sponsors to the Compustat Fundamentals Annual file. Requiring that firms have non-missing data for all variables used in this study leaves 2,005 firms with defined benefit plans in the sample.

To identify Chapter 11 filings, I use Lynn M. LoPucki's Bankruptcy Research Database (BRD) which is commonly used in bankruptcy studies. The BRD contains information on all bankruptcy filings (Chapter 11) and liquidation filings (Chapter 7) from 1980 to 2012 for U.S. firms with assets of $100 million or more, measured in 1980 dollars. Out of the 961 bankruptcy cases in the BRD, there are 244 Chapter 11 filings by defined benefit sponsors from 1987 to 2012. In turn, 236 out of the bankrupt defined benefit sponsors have data at most two fiscal years prior to the Chapter 11 filing[35]. Thus, the main sample used in this paper consists of 236 defined benefit sponsors who filed for Chapter 11 bankruptcy between 1987 and 2012.

Panel B of Table 3.2 reports the industry distribution of my sample of bankrupt

[35]The number of Chapter 11 cases drops from 244 to 236 because the sampling criteria in the BRD is for firms to have filed Form 10-K with the SEC at most three years prior to bankruptcy. Eight of the defined benefit sponsors had last filed three years prior to bankruptcy, so they are excluded from my sample. However, the results presented in the paper remain unchanged if those companies are used as well.

defined benefit sponsors. Industry affiliation is based on the Fama and French 48-industry classification and 31 of the 48 industries are represented in my sample. As the table shows, 16% of bankruptcies in my sample come from defined benefit sponsors from the Retail industry. Defined benefit sponsors in the Transportation, Steel Works, and Automobile industries experience the next highest rates of default, with 8%, 7% and 7% of sample firms, respectively. The results in Panel B indicate that there is a significant dispersion in the sample firms in terms of their industry affiliation.

As in the previous essay, defined benefit assets and obligations and operating leases are consolidated with balance sheet assets and liabilities. The same regard to changes in accounting rules over time was paid when off balance sheet amounts were brought back on the balance sheet. In particular, to measure firms' financial position, I use two new measures of firm assets and liabilities: adjusted assets and adjusted liabilities. Adjusted assets include the book value of firm assets plus the values of operating leases and defined benefit assets, less the portion of pension values included on the balance sheet. Adjusted liabilities equal the sum of total balance sheet liabilities plus defined benefit obligations and operating leases, less the pension values already included on the balance sheet. Defined benefit obligations are scaled by these additional liabilities to capture the role of pension claimants relative to all other creditors. Additional leverage equals adjusted liabilities less short-term and long-term debt, scaled by adjusted assets and financial leverage equals short-term and long-term debt scaled by adjusted assets. These two leverage measures are used to control for the firm's indebtedness. Appendix A at the end of the thesis provides a detailed discussion of the accounting rule changes and how they influenced the variables used in both essays. Section 2.3.2 in the previous chapter describes how the main control variables are constructed.

3.3.1 Additional Datasources

Some of the variables used in this paper come from sources other than Compustat and the BRD. In this subsection, I discuss where information on these variables was obtained from. All pension and financial variables in this study are measured at the last fiscal year prior to the Chapter 11 filing. All variables and the databases

from which they are obtained are presented in Table 3.1.

Pension Variables

At the firm level, data on pension plan assets (PPA) and pension liabilities (pension benefit obligation, PBO) come from Compustat. To identify whether firm employees are represented by a union, I check firms' Form 5500 filings with the Department of Labor (DOL)[36] and Form 8-K and 10-K filings with the Securities and Exchange Commission (SEC) available on Edgar[37]. Using these sources, I identify the unionization status for 95 firms from Form 5500[38], 57 firms from bankruptcy reorganization plans (8-K filings), and 24 firms from 10-K filings at the year prior to Chapter 11 bankruptcy. Thus, I am able to classify 176 out of the 236 bankrupt sponsors as being unionized or not.

Another variable of interest in this study is the decision to terminate a defined benefit pension plan in bankruptcy. To determine if a plan termination occurred, I first check the PBGC website for mentions of any plan terminations for of the 236 sample firms. From PBGC reports, I find that 70 of the firms in my sample terminated at least one defined benefit plan in bankruptcy, and 45 emerged from Chapter 11 with their plans intact, for a total of 115 events. Next, I identify 74 pension plan terminations from Form 5500[39]. Out of those terminations, 42 cases overlap with the events identified from the PBGC website, so 32 terminations contributed additional events to my sample. Last, I count all firms that liquidated in bankruptcy as having terminated their pension plans, resulting in 25 additional terminations. Fol-

[36]Pension plan sponsors with more than 100 employees have to annually file Form 5500 with the Internal Revenue Services (IRS) and the DOL for each of the pension plans that they sponsor. In the form, firms provide information on the pension plan such as the plan's assets and liabilities and the actuarial assumptions used to evaluate different plan variables, among others.

[37]Publicly traded firms file Form 10-K annually with the SEC at their fiscal year end and Form 8-K whenever a material event, such as a bankruptcy filing, a merger, or a change in control, occurs.

[38]Since Form 5500 data is reported at the plan level and I use firm-level data, I sum across firms' plans every year to convert the plan information to firm-level data. As a result, a firm is classified as having a union if at least one of its pension plans is covered by a collective bargaining agreement. In turn, a firm is classified as not having a union if none of its pension plans are represented by a union.

[39]Following the consolidation procedure described in the previous footnote, a firm is classified as having terminated a pension plan in bankruptcy if it terminated at least one of its defined benefit plans while in Chapter 11. In turn, a firm is classified as not having terminated a pension plan in bankruptcy if none of its defined benefit plans were terminated in Chapter 11.

lowing these procedures, I am able to identify whether 172 out of the 236 sample firms terminated at least one of their pension plans in Chapter 11.

While most tests in this study are based on pension data at the firm level, one specification calls for the use of pension information at the plan level. Compustat consolidates across firms' pension plans to provide firm-level measures of the pension variables. Form 5500, however, provides pension information at the plan level: firms file Form 5500 for each pension plan that they sponsor[40]. Therefore, for these tests I use pension plan information from Form 5500 filings. Form 5500 data covers the period from 1990 to 2007 and firms on it are identified by employer insurance number (EIN) and firm name. I take several steps to link Form 5500 data to Compustat data. First, I use the EIN, name and fiscal year to link the two databases. Following this procedure I am able to match 110 Form 5500 firm-years to Compustat. For the remaining companies without a valid EIN link, I match Form 5500 firms to Compustat firms based on firm name and fiscal year[41]. In this way, I identify 43 additional firm-year matches. Altogether, I am able to match Form 5500 and Compustat data for 153 of the 179 sample firms in the same time period. Imposing that firms have pension and financial data at most two years prior to bankruptcy reduces the sample to 94 firm-years. In addition, requiring all firms to have non-missing values for the Form 5500 variables used in the tests brings sample size to 83 firms with all the necessary data from Compustat and Form 5500. Thus, 83 out of the 179 sample firms from 1990 to 2007 are included in the plan-level tests, for a total of 176 plan-level observations. As a comparison between the two pension databases, the aggregate defined benefit plan assets for the 83 firms on Form 5500 data equal approximately $27,000 million whereas the pension assets for these firms on Compustat equal $36,500 million[42].

[40] As Rauh et al. (2012) emphasize, subsidiaries that are more than 80% owned by the parent can report their pension obligations in separate Form 5500 filings from the parent firm. Therefore, it is necessary to aggregate subsidiaries' information with the parent filings to obtain the firm's pension assets and liabilities from Form 5500 filings. Form 5500 data used in this paper does not consolidate subsidiaries' pension plans with the parent firm.

[41] In the matching procedure, names are cleaned of any symbols, such as hyphens, quotation marks etc., and abbreviations in firm names are accounted for. After the names are cleaned, only identical name matches are used to reduce matching error.

[42] The sum of all defined benefit plan assets is lower when Form 5500 data is used instead of Compustat data. Such a difference in plan assets could be due to the fact that Form 5500 does not consolidate subsidiaries' plans with the parent's plan. However, a discrepancy between the variables

Bankruptcy Variables

From the BRD, I collect data on the date of the bankruptcy filing, the duration of the reorganization, the state in which Chapter 11 was filed, and whether the bankrupt firm refiled for bankruptcy after emerging. While an older version of the BRD provides data on the outcomes of Chapter 11, the updated database no longer reports bankruptcy outcomes. Therefore, I re-construct the outcome variable using the following steps. First, I identify bankruptcy outcomes for 185 of the 236 firms from Form 8-K filings. Then, I compare the outcomes from the 8-K filings to the outcomes on the BRD. In 150 cases, the outcomes from the two databases are identical. For the remaining 35 bankruptcies with contradicting outcomes and the 51 bankruptcies with no data on Form 8-K, I manually search Factiva, a research tool created by Dow Jones & Company, to determine the Chapter 11 outcome. As a result, I am able to identify the outcomes of all bankruptcy cases in my sample.

Previous research has shown that it is important to control for firm capital structure complexity in bankruptcy (Gilson, John, and Lang, 1990). Following the literature, I control for this complexity by using the number of classes with claims to the firm's assets in bankruptcy. Upon bankruptcy filing or exit, firms disclose the number of claim classes in Chapter 11 in Form 8-K filings with the SEC. I read firms' 8-K filings from the bankruptcy filing date through the resolution date to identify the number of claim classes in Chapter 11. Since reporting information on 8-K filings is not mandatory and as regulated as 10-K filings, I am only able to obtain information on the number of claim classes in bankruptcy for 107 of the 236 Chapter 11 cases in my sample.

Financial Variables

Financial data for the control variables used in this paper come from Compustat. Data on unsecured creditors' recovery rates come from Capital IQ, a relatively

in the two datasources can also be due to the fact that Compustat consolidates international and domestic plans, whereas firms file Form 5500 only for domestic plans. According to the Form 5500 instructions, most pension plans maintained outside the U.S. are exempt from filing Form 5500. Those foreign plans that have to report to the IRS file Form 5500-EZ, which is not a part of the sample forms used in this study.

novel database provided by the Standard and Poor's. Using the Capital IQ database, I identify recovery rate data for 32 of the 244 firms in the sample. The unsecured creditors' recovery data covers the period from 2006 to 2012.

3.3.2 Summary Statistics

In this subsection, I discuss the summary statistics for the main sample used in this study, as well as for several subsamples of firms for which results are also estimated.

Panel A of Table 3.3 provides summary statistics for firm, pension plan, and bankruptcy characteristics for the full sample of 236 bankrupt defined benefit sponsors. The top part of the panel presents firm characteristics for the sample firms. The average firm in the sample has assets worth $1,701 million and firm size increases to $2,139 million when defined benefit assets and operating leases are accounted for. Sample firms are 45% levered on average. Additional leverage, measured as total balance sheet liabilities, defined benefit obligations and operating leases less short-term and long term obligations is 57% of adjusted assets on average. Moreover, on average sample firms hold 4% of their assets in cash, tangible assets constitute 25% of adjusted assets, and the average return on adjusted assets is 4%. The mean age of sample firms is 25 years old, with firms being as young as 3 years old and as old as 62 years. The average firm employs 13,000 workers. In addition, of the 176 sample firms with data on unionization, 60% have at least some of their employees covered by a union.

In terms of pension plan characteristics, pension assets constitute 11% of overall firms assets, on average, and pension liabilities amount to 13% of adjusted assets on average. In addition, the average ratio of defined benefit pension obligations to adjusted liabilities equals 13%. The ratio exhibits substantial variation across firms in the sample. For example, the median contribution of pension obligations to adjusted liabilities is close to 9% but the pension liabilities can be as high as 59% of overall liabilities. In addition, the average ratio of unfunded pension liabilities to adjusted liabilities in the sample is 2%. While the minimum ratio can be negative, indicating that some plans in the sample are overfunded, the maximum ratio of unfunded pension obligations to adjusted liabilities is 48%.

The bottom part of Panel A, Table 3.3, reports summary statistics for sample firms' bankruptcy case characteristics. Out of the 172 cases with information on distressed terminations, 58%, or 100 firms, terminate at least one pension plan in bankruptcy. A quarter of the sample firms agree with all creditors on the reorganization plan prior to filing for Chapter 11. Close to 40% of the sample bankruptcy cases are filed in the state of Delaware. In addition, the average duration of bankruptcy in the sample is 20 months. As a comparison, the average duration of 20 months in my sample is comparable to the average duration of 17 months in Jiang et al. (2012)'s sample over the period 1996 to 2007. On average, 73% of sample firms emerge from Chapter 11 bankruptcy, and 19% of those companies refile for bankruptcy after having successfully reorganized once. In comparison, the likelihood of emergence in samples of all Compustat firms was 60% on average over both the period 1979-2005 (Bharath, Panchapegesan, and Werner, 2009) and 1996-2007 (Jiang et al., 2012). For the sample of 107 cases for which I was able to obtain information on the number of claim classes, the average firm faced 10 classes of different claimants in Chapter 11. The number of claimants varies for the sample firms, with 3 classes being the minimum and 62 classes the maximum number of separate claimants listed on the bankruptcy reorganization plan[43]. The summary statistics for the number of claim classes in bankruptcy are largely in line with those reported in Jiang et al. (2012).

The remainder of Table 3.3 reports summary statistics for the different subsamples of firms used in various specifications throughout this essay. I do not report separate summary statistics for the set of 176 firms with data on unionization because these statistics are close to identical to the statistics in the main sample of firms.

Panel B of Table 3.3 provides statistics for the 107 firms from the main sample for which I could identify the number of claim classes in bankruptcy. Firms in this subsample are slightly larger and more levered than companies in the main sample. In addition, only 40% of firms in this set terminate a pension plan in bankruptcy,

[43]The bankruptcy case with 62 claim classes is that of Magna Entertainment Corp which filed for Chapter 11 in 2009. In the joint plan of reorganization, the company lists 36 classes of creditor claims and 26 classes of equity claims. Apart from that case, the next highest number of claim classes is 24.

compared to close to 60% of firms in the main sample. Firms in the sample with claim classes information are more likely to emerge from bankruptcy, with 86% of firms emerging in this sample, compared with 73% in the main sample. This result is not surprising as information on the number of claim classes was obtained from firms' plans of reorganization. While firms that liquidated in bankruptcy also file a plan of liquidation with the SEC, they do not always report the number of claimants in bankruptcy. As a result, the sample firms with claims information represents more firms that emerge from bankruptcy than the main sample. All other characteristics are comparable to those in the main sample.

The next panel in Table 3.3 reports summary statistics for the 176 plan-level observations of 83 unique firms with information on Form 5500 data. There are 90 firm-year observations in this sample as firms that refile for bankruptcy appear in the sample more than once. On average, sample firms sponsor 2 defined benefit pension plans. The median firm sponsors 1 plan, but there are firms which sponsor as many as 26 defined benefit plans in a year. The average plan age is 29 years and the oldest plan in the sample is 78 years old. These statistics indicate that most defined benefit pension plans were established a long time ago. In comparison, the average firm in this sample is 32 years old and the oldest sponsor is 56 years old. Such a differences in the maximum ages is possible since firm age is measured as the first year in which the firm appears in the Compustat database, whereas plan age is calculated by using the first date in which the pension plan became effective. As firms may have started sponsoring a defined benefit pension plan while they were a private company, firm age and plan age do not have to coincide.

In terms of pension variables, plan-level assets and liabilities represent a smaller portion of firm assets and liabilities which can be expected given that the main sample consolidates all plans into a single firm observation. Moreover, 43% of plans in the sample are represented by a union, compared to the sample average of 60%. The average plan covers close to 6,000 employees of which 32% are actively working and earning benefits under the defined benefit plan. The remainder of the covered employees are either retirees, employees who are working but have not reached the vesting requirement, or deceased beneficiaries whose spouses earn some of the promised benefits. Last, 44% of the sample pension plans are terminated in bankruptcy, compared to 60% in the main sample.

Panel D of Table 3.3 presents summary statistics for the 32 firms with data on unsecured creditors' recovery rates. Firms in this subsample are larger than firms in the full sample, with the median adjusted assets in the subsample equal to $1,264 million and the median firm size in the main sample equal to $589 million. With an average financial debt of 57% and additional debt of 53%, the 32 firms have more financial liabilities and fewer additional liabilities than firms in the main sample. In addition, firms in the subsample have somewhat higher ratios of pension liabilities and unfunded pension liabilities to adjusted liabilities. In terms of the other firm characteristics, the 32 firms in the subsample are largely comparable to the main companies under study. In addition to firm characteristics, the table presents summary statistics for the variables used in equation (3.4). Firms in the subsample have a market value of equity of 9% relative to adjusted assets, a default barrier of 44% relative to adjusted assets and they issue 56% of debt in long-term debt instruments on average.

In addition, Panel E in Table 3.3 reports the pairwise correlation coefficients for the main variables used in the tests in this paper. As the coefficients in the table indicate, none of the variables are strongly correlated.

3.3.3 Univariate Comparisons

Along with the summary statistics in the last fiscal year prior to Chapter 11, I consider how the main variables of interest change as a result of the bankruptcy restructuring. Out of the 236 defined benefit sponsors in the sample, 64 companies have non-missing data on all variables of interest in the year prior to bankruptcy and in the year after emergence. I compare the median values of these variables before and after bankruptcy and present results from these univariate comparisons in Table 3.4. The results in the table show that while firm size declines only marginally upon emergence for the sample firms, financial leverage is reduced almost in half in the bankruptcy restructuring. In addition, firms' cash holdings almost double after reorganization relative to their levels prior to bankruptcy. At the same time, none of the pension plan variables appear to change significantly throughout the reorganization period.

In Figure 3.1, I also plot the evolution of defined benefit pension obligations

and pension assets in event time for these 64 firms. As the figure shows, the values of the pension liabilities is relatively similar in the years right before and right after bankruptcy, but both pension assets and pension obligations decline significantly in the years after reorganization. These trends could indicate benefit reductions as a result of bankruptcy. In the next sections, I turn to test these changes and their determinants in a multivariate setting.

3.4 Bankruptcy Duration

In this section, I ask whether defined benefit claimants are related to the duration of the bankruptcy restructuring process. Previous studies have documented a relationship between various alternative lenders and bankruptcy duration, so I consider if pension claimants also influence the speed of reorganization. I control for the firm's overall indebtedness and consider if the ratio of pension obligations to overall liabilities provides explanatory power for the time spent in bankruptcy. The premise of this design is that once I account for all firm obligations, the contribution of pension liabilities to adjusted liabilities will capture the role of defined benefit claimants in the reorganization process.

3.4.1 Regression Specification

Following the literature, I account for several variables that have been found to be related to the time spent in bankruptcy. Denis and Rodgers (2007) identify firm size and leverage as key variables that influence the duration of bankruptcy. Moulton and Thomas (1993), Hotchkiss (1993) and Bryan et al. (2002) provide similar evidence relating size and leverage to bankruptcy outcomes. Therefore, I control for firm size, measured as the logarithm of adjusted assets, and leverage, measured as short-term and long-term debt scaled by adjusted assets, in the specifications. While this definition of leverage is commonly used in the literature, it largely understates firms' true financial position (Eisfeldt and Rampini, 2009; Shivdasani and Stefanescu, 2010; Welch, 2011)[44]. To account for firms' overall

[44]The traditional definition of leverage scales the sum of short-term and long-term debt by total assets. My measure differs from the standard leverage measure as it scales the sum of short-term and

indebtedness, I also include additional leverage, measured as the remaining part of total balance sheet liabilities and two of the largest balance sheet liabilities, defined benefit obligations and operating leases. The underlying assumption of including all firm liabilities is that all claimants are important in a bankrupt firm (Denis and Rodgers, 2007).

Along with size and indebtedness, I control for several additional firm characteristics that have been found to influence Chapter 11 outcomes. I use cash to adjusted assets and cash flow volatility as proxies for the firms' liquidity, the ability to meet short-term commitments and the potential to generate working capital funds. I control for the share of tangible assets relative to adjusted assets as a measure of liquidity and debt capacity. Moreover, since less profitable firms are likely to become less liquid and more highly geared, I control for profitability by including return on assets divided by adjusted assets.

In addition to firm characteristics, I account for some bankruptcy features which have been found to matter in the Chapter 11 reorganization. Prepackaged bankruptcies are typically accompanied by a plan of reorganization that has been accepted by all existing claim classes. As a result, firms that file a prepackaged bankruptcy will spend time less in bankruptcy than firms that do not file a prepackaged bankruptcy. Hence, I control for prepackaged filings by including an indicator variable equal to one if the reorganization plan was preapproved by creditors in the regression specifications. In light of evidence that firms may strategically choose the state in which they file for bankruptcy, I also include a dummy variable equal to one if a firm files for bankruptcy in the state of Delaware (Ayotte and Skeel, 2004).

To determine the influence of defined benefit claimants on the duration of bankruptcy, I use the ratio of defined benefit obligations to adjusted liabilities. After controlling for the firm's overall indebtedness, the ratio of pension obligations to overall liabilities captures the impact of defined benefit claimants relative to the firm's other lenders. Thus, I focus on the composition of the firm's creditors and on whether pension claimants exert any influence beyond that of traditional lenders.

Motivated by Campbell (1996) who finds that bankruptcy outcomes vary by industry and Dahiya et al. (2003) who note that the costs of financial distress may differ from one industry to another, all regressions include industry fixed effects.

long-term debt by adjusted assets.

Since bankruptcy cases vary over time (Bharath et al., 2009) and because firms that file for bankruptcy in a recession could be intrinsically different from firms that default during normal times (Ivashina, Iverson, and Smith, 2013), I also include year fixed effects to capture time trends in the data. Including all of these variables, the main specification is estimated as follows:

$$\begin{aligned} Duration_{it} = \alpha_0 + \alpha_1 \left(\frac{DB\ Liabilities}{Adjusted\ Liabilities} \right)_{it-1} + \alpha_2 Ln(Adj.\ Assets)_{it-1} + \\ + \alpha_3 Leverage_{it-1} + \alpha_4 Additional\ Leverage_{it-1} + \alpha_5 Cash_{it-1} + \\ + \alpha_6 CF\ Volatility_{it-1} + \alpha_7 Tangibility_{it-1} + \alpha_8 ROA_{it-1} + \\ + \alpha_9 Prepackaged_{it} + \alpha_{10} Delaware_{it} + \gamma_j + \gamma_t + \varepsilon_{it-1} \end{aligned} \tag{3.1}$$

where *Duration* is the natural logarithm of the number of months spent in Chapter 11 and γ_j and γ_t are industry and year fixed effects, respectively. The main coefficient of interest is α_1 as it captures the role of defined benefit claimants relative to the firm's other creditors.

Prior studies have documented at least two additional variables that could be relevant determinants of bankruptcy outcomes: firm unionization levels and the number of classes that hold claims to the firm's assets in bankruptcy. As documented by Chen, Kacperczyk, and Ortiz-Molina (2011), unions represent a powerful stakeholder who is actively involved in bankruptcy negotiations. Moreover, some defined benefit pension plans are established under collective bargaining agreements with unions. Therefore, unions are likely relevant for the outcomes of bankruptcy. At the same time, Gilson et al. (1990) suggest that capital structure complexity may play a role in the reorganization process. Following the literature, I capture the capital structure complexity by considering the number of claim classes in bankruptcy. While these two variables may be important to include in the main tests, data on firm unionization levels and on claim classes is sparse. For that reason, I do not include these variables in the main tests but I report results for the subsamples with data on unionization rates and claim classes.

Next, I repeat the above estimations by substituting the ratio of defined benefit

obligations to adjusted liabilities with the ratio of unfunded pension obligations to adjusted liabilities. In that way, I consider whether the portion of pension liabilities which is not secured by pension assets predicts defined benefit claimants' actions.

3.4.2 Determinants of Bankruptcy Duration

In Table 3.5, I estimate equation (3.1) in the main sample of 236 bankrupt defined benefit sponsors as well as two subsamples with union and claim classes data. The dependent variable in all models is the logarithm of the number of months spent in Chapter 11 and the independent variables are the firm and deal characteristics defined above. All specifications include industry and year fixed effects and standard errors clustered at the industry level[45].

Model 1 in Table 3.5 presents results for the benchmark regression with the variables commonly used in studies of duration in the literature. In line with previous studies, I find that larger firms spend longer in bankruptcy reorganization whereas more levered firms resolve the Chapter 11 process faster. To the extent that higher leverage leads firms to become bankrupt more quickly, firms with higher pre-bankruptcy leverage may be less economically distressed and, therefore, more likely to reorganize faster in bankruptcy. However, the leverage results are limited to the traditional measure of leverage: additional leverage does not influence the duration of bankruptcy. Moreover, firms with volatile cash flows spend more time in bankruptcy, as do more profitable firms. The results in Model 1 also confirm that prepackaged bankruptcies and filings in Delaware are associated with an accelerated resolution of bankruptcy. Since in a prepackaged bankruptcy, the plan of reorganization has typically been approved by all claim classes, firms that file such bankruptcies spend significantly less time reorganizing under Chapter 11.

In Model 2 I examine the role of defined benefit claimants on bankruptcy duration by including the ratio of defined benefit obligations to the firm's adjusted liabilities in the regression specification. As the results show, the variables from the benchmark specification retain their signs and significance in Model 2. The ratio of pension liabilities to adjusted liabilities does not influence the time firms

[45]The results remain unchanged under different clustering specifications.

spend reorganizing in my sample.

Model 3 considers the impact of accounting for firms' unionization status on the role of defined benefit claimants in bankruptcy. Including the union variable in the specification does not alter the benchmark results and pension claimants do not influence the duration of bankruptcy in this subsample. However, the union dummy enters the specification with a negative and significant coefficient. In particular, switching from not having a union to having employees represented by a union is associated with a 26% reduction in the duration of bankruptcy. Thus, while defined benefit claimants do not impact duration, unions facilitate negotiations in Chapter 11 and accelerate the resolution of bankruptcy reorganization.

In the fourth specification, I consider whether accounting for firms' capital structure complexity changes the main results on the determinants of bankruptcy duration. Due to data availability, the tests on the importance of accounting for different claim classes are restrained to the 107 companies with such data. In this reduced sample, prepackaged bankruptcies are the only control variable with significant explanatory power for bankruptcy duration. None of the other controls, including the benchmark variables, the measure of pension claimants' role, or the number of claim classes are significant determinants of the time spent in Chapter 11 in Model 4.

The last three models in Table 3.5 present results for tests using underfunded pension obligations as a proxy for the role of defined benefit claimants in bankruptcy. The results in the last three columns are in line with the rest of the findings: higher leverage, prepackaged bankruptcies, and Delaware filings are associated with faster bankruptcy reorganization, whereas size, cash flow volatility and profitability are related to longer bankruptcy duration. The unfunded portion of defined benefit obligations relative to the firm's overall liabilities does not impact the time firms spend reorganizing in my sample. Unions, on the other hand, are related to an expedited restructuring under Chapter 11. Therefore, unions appear to facilitate the bargaining among creditors in bankruptcy reorganization.

Overall, the results from Table 3.5 indicate that defined benefit claimants do not influence the duration of bankruptcy reorganization. Controlling for the firm's total indebtedness, pension claimants do not impact the length of Chapter 11 proceedings beyond the influence of the firm's other lenders in my sample.

3.5 Emergence from Chapter 11

In this section, I examine whether defined benefit claimants are related to the likelihood that firms emerge from bankruptcy reorganization. As the likelihood of successful reorganization is a common outcome of interest in studies of bankruptcy, I consider whether pension claimants influence the probability of emergence. I use the same regression specification and control variables as in the tests of bankruptcy duration since both duration and emergence are bankruptcy outcomes likely determined by similar firm characteristics. Once again, I control for overall indebtedness and I measure the relative role of defined benefit claimants using the ratio of pension obligations to overall liabilities.

3.5.1 Determinants of the Likelihood to Emerge

To test for a relationship between defined benefit claimants and the likelihood that firms emerge from bankruptcy, I estimate equation (3.1) in the sample of 236 bankrupt defined benefit sponsors. The results on the likelihood of emergence are presented in Table 3.6. The dependent variable is an indicator variable equal to one if a firm successfully emerges from bankruptcy, and zero otherwise, and the independent variables are the firm and deal characteristics defined above. All specifications include industry and year fixed effects and robust standard errors clustered at the industry level.

Model 1 in Table 3.6 reports results for the benchmark regression using the variables commonly used in the literature to explain the likelihood that firms emerge from bankruptcy. Consistent with previous studies, I find that larger firms are more likely to emerge from bankruptcy. In addition, higher leverage is associated with a higher likelihood of successful reorganization. If higher leverage leads to bankruptcy more quickly, firms with higher pre-bankruptcy leverage may be less economically distressed and, therefore, more likely to be able to reorganize and emerge from bankruptcy than firms with lower leverage. Once again, the leverage effect is only significant for the traditional leverage measure and not for additional leverage. Not surprisingly, firms that file a prepackaged bankruptcy are more likely

to emerge as a new entity since their plan of reorganization was accepted by all claimants prior to the filing.

Models 2 to 7 in Table 3.6 modify the benchmark model by including the two proxies of the role of defined benefit claimants. Model 2 considers the effect of the ratio of defined benefit obligations to overall liabilities on the probability of emergence. The results indicate that the portion of adjusted liabilities that is comprised of defined benefit obligations is not related to the likelihood that firms emerge from Chapter 11 in my sample. Therefore, defined benefit claimants do not appear to influence the likelihood of successful reorganization in bankruptcy above the impact of traditional lenders.

The next two specifications consider the relationship between emergence and the role of pension claimants when unionization and claim classes are considered. As the results from Model 3 show, accounting for whether firm employees are represented by a union does not change the results from the two previous specifications. Firm unionization status, however, is positively related to the likelihood of successful reorganization in bankruptcy. In particular, switching from no union representation to union representation is related to a 14% increase in the probability of bankruptcy emergence, which is sizable given the sample average likelihood of emergence of 73%. Therefore, unions appear to positively impact the bankruptcy reorganization process in terms of the likelihood of successful reorganization under Chapter 11. This finding supports the results from Table 3.5 for a role for unions in aiding negotiations in bankruptcy. However, the unionization effect is only significant at the 10% level. Last, when the complexity of firms' capital structure is considered (Model 4), firm size and the Delaware indicator are the only significant predictors of the likelihood that firms emerge from Chapter 11. The ratio of pension liabilities to adjusted liabilities is not significant in either subsample.

Models 5 to 7 in Table 3.6 consider the relationship between emergence and defined benefit claimants as proxied by the ratio of the unfunded pension obligations to adjusted liabilities. The results in these models are identical to those in Models 2 to 4. Once again, pension claimants do not seem to influence emergence from bankruptcy in these models. Unions, on the other hand, are related to a higher probability of bankruptcy emergence. In sum, the results in Table 3.6 suggest that defined benefit claimants do not influence the likelihood that firms reorganize suc-

cessfully in Chapter 11 beyond traditional lenders' impact.

3.6 Defined Benefit Plan Termination in Chapter 11

In this section, I consider whether defined benefit claimants influence firms' decision to terminate a defined benefit pension plan in bankruptcy. Chapter 11 bankruptcy is a particularly costly form of reorganization for pension claimants because it is the only time in which underfunded defined benefit plans can be terminated. Having discussed the threat of plan termination as a possible driver of pension claimants' actions to avoid Chapter 11 bankruptcy in the previous essay, I now test whether defined benefit claimants influence the termination decision in bankruptcy. The core insight for this test is that if pension claimants are related to distressed plan terminations, they may anticipate this outcome before bankruptcy which in turn gives them an incentive to avoid bankruptcy, as discussed in the first essay.

3.6.1 Regression Specification

While the specification in equation (3.1) is useful in predicting bankruptcy and its outcomes, the decision to terminate a pension plan in bankruptcy is likely driven by different factors. Therefore, I turn to the literature for appropriate determinants of the plan termination decision. The literature on defined benefit terminations in bankruptcy is largely focused on the termination of overfunded pension plans outside of bankruptcy. Rauh (2009) is a notable exception as he considers distress pension terminations in his study of corporate pension plans' investment policies. I use Rauh (2009)'s model of distressed terminations as the benchmark specification and I extend it to include my measures for the role of pension claimants in bankruptcy. Defined benefit claimants may influence the decision to terminate their pension plan by actively opposing the proposed termination and related reorganization plan or by agreeing to the termination without many objections.

Following Rauh (2009), I study defined benefit plan terminations at the plan level. As a result, the sample of firms for which this test can be carried out is

constrained to those companies with data on Form 5500. Rauh (2009) controls for the pension funding status, defined as pension assets minus pension obligations divided by pension obligations, and the share of employees covered by the pension plan who are currently working (as opposed to retirees). The model also includes the pension plan assets and the logarithm of the pension plan assets as explanatory variables. Lastly, the author controls for the return on pension plan assets and year fixed effects in the regression. Rauh (2009) finds that better funding status, a larger share of active employees, a larger size of the plan assets, and higher investment returns are all associated with a lower likelihood that the pension plan is terminated in bankruptcy.

I extend the model used by Rauh (2009) to account for the role of defined benefit claimants in bankruptcy. I am interested if after controlling for the firm's financial condition, defined benefit claimants are related to the decision to terminate the pension plan in bankruptcy. Therefore, I extend Rauh (2009)'s model to include the firm's overall indebtedness, measured by financial and additional leverage. Then, I add the ratio of defined benefit obligations to the firm's overall liabilities to proxy for defined benefit claimants' bargaining power in bankruptcy relative to the firm's other lenders. I estimate the following model:

$$\begin{aligned} Terminate_{it} = \alpha_0 + \alpha_1 \left(\frac{DB\ Liab.}{Adjusted\ Liab.} \right)_{it-1} + \alpha_2 \left(\frac{DB\ Assets - DB\ Liab.}{DB\ Liab.} \right)_{it-1} + \\ + \alpha_3 Active\ Share\ of\ Employees_{it-1} + \alpha_4 DB\ Assets_{it-1} + \\ + \alpha_5 Ln(DB\ Assets)_{it-1} + \alpha_6 Leverage_{it-1} + \\ + \alpha_7 Additional\ Leverage_{it-1} + \gamma_t + \varepsilon_{it-1} \end{aligned} \tag{3.2}$$

where *Terminate* is an indicator variable equal to one when a specific defined benefit pension plan is terminated in bankruptcy, and zero otherwise, *DB Assets* equals the pension plan's assets (as opposed to the consolidated pension assets at the firm level) and all defined benefit pension variables come from Form 5500. Following Rauh (2009), all specifications include year fixed effects and standard errors clustered at the firm level.

The main results of estimating equation (3.2) focus on the sample of firms with plan-level data from Form 5500. In addition, I re-estimate the above model by accounting for unionized plans and capital structure complexity. Plan-level data is more appropriate than firm-level data in studying pension plan terminations because firms often sponsor multiple pension plans and may not terminate all of them in bankruptcy. At the firm level, it is more difficult to pin down the determinants of plan termination because the termination variable captures whether at least one of the firm's plans is terminated. Nevertheless, I also report results for the model in equation (3.2) estimated at the firm level[46].

3.6.2 Determinants of Pension Plan Termination

Table 3.7 provides results from estimating equation (3.2) at the plan level in the subsample of firms with Form 5500 data. The dependent variable in all specifications is an indicator variable of whether a specific defined benefit pension plan is terminated in bankruptcy or not.

Panel A of Table 3.7 reports results for the 176 plan-level observations with data on Form 5500. Model 1 presents the benchmark model which includes the variables suggested by Rauh (2009) as well as my two leverage controls. While Rauh (2009) finds all variables but the plan assets to be negative and statistically significant determinants of distressed plan terminations, none of the variables are significant in my sample. Firm leverage is the only significant variable in Model 1: higher leverage is associated with a lower likelihood of pension plan termination in the benchmark specification.

Model 2 examines defined benefit claimants' influence on the pension plan termination decision. Once again, higher firm leverage is related to a lower probability of pension plan termination. In addition, I find evidence that the ratio of defined benefit obligations to adjusted liabilities provides explanatory power to the benchmark model. In particular, pension plans with higher obligations relative to the firm's overall liabilities are more likely to be terminated in bankruptcy. The

[46]Untabulated tests show that the results from estimating equation (3.2) at the plan and firm levels remain unchanged if I only use the variables identified by Rauh (2009) and my proxies for the role of defined benefit claimants in bankruptcy (i.e. if I do not control for firm leverage).

effect is economically significant: a one standard deviation increase in the ratio of pension obligations to adjusted liabilities is associated with a 10% increase in the likelihood of pension plan termination in bankruptcy. The effect is economically meaningful given that the sample average likelihood of a distressed pension plan termination is 44%. These findings imply that whenever defined benefit claimants are more sizable relative to the firm's other lenders, and hence, more likely to negotiate with the firm, pension plans are more likely to be terminated. As agreeing to termination is not in the best interest of defined benefit claimants, this result indicates that plan terminations are one concession that defined benefit claimants have to accept in bankruptcy.

An alternative explanation might be that firms are more likely to terminate pension plans whenever it is more profitable for them to do so, i.e. when the pension liabilities are large relative to the firm's other liabilities. I return to this argument in the last few columns of Table 3.7 (discussed below) and find no evidence to support the claim. Overall, the relationship between defined benefit obligations and distressed plan terminations indicates that defined benefit claimants exert an influence above the impact of the firm's other lenders.

The positive and significant relation between plan terminations and the ratio of defined benefit obligations to adjusted liabilities remains after controlling for plan unionization rates. In Model 3, the union variable shows whether a specific plan is subject to a collective bargaining agreement and represented by a union in bankruptcy. Controlling for unionization does not impact the main results. Therefore, the relationship between plan terminations and relative pension liabilities cannot be explained by union representation.

The next specification presents estimation results for the subsample of 103 plan-years with data on the number of claim classes in bankruptcy. The results from Model 4 show that there is a positive and significant relationship between plan termination and the ratio of defined benefit liabilities to adjusted liabilities after controlling for firms' capital structure complexity.

If the Model 2 results are driven by firms which terminate those pension plans that are more beneficial to end, the effect between termination and defined benefit obligations should be even stronger when the unfunded portion of defined benefit liabilities is considered. Firms will gain the largest benefit from terminating their

most underfunded plans because by doing so, firms can offload a larger liability to the PBGC than if they terminate a better funded plan. The results in the last three columns of Table 3.7 provide no support for this story. In particular, the ratio of unfunded pension obligations to overall liabilities is not significantly related to plan terminations. The other explanatory variables retain the same sign and significance as in the main specification.

As a consistency check, I also study the relation between defined benefit claimants and termination decisions at the firm level. Panel B of Table 3.7 presents results for the 171 firms from the main sample for which information on pension plan termination was obtained. The dependent variable in the firm-level specifications equals one when at least one of the firm's pension plans is terminated in bankruptcy, and zero if none of the firm's plans are terminated. The active share of employees covered by a pension plan is no longer included as a control variable because this variable is not available on Compustat[47].

In the benchmark specification at the firm level, the logarithm of pension plan assets is a negative and statistically significant determinant of the likelihood that firms terminate at least one of their pension plans in Chapter 11. Higher firm leverage is also associated with a lower frequency of pension plan terminations in bankruptcy. Moreover, higher additional leverage is positively related to plan terminations, but the effect is significant only at the 10% level. The firm funding status is not related to the likelihood that firms terminate a defined benefit plan in Chapter 11.

Models 2 to 4 in Panel B of Table 3.7 consider the role of defined benefit claimants in distressed plan terminations at the firm level. Similarly to the plan-level results, at the firm level the ratio of pension obligations to adjusted liabilities provides positive and significant explanatory power beyond the benchmark controls. Once again, the effect is economically meaningful. In particular, a one standard deviation increase in the ratio of pension obligations to overall firm liabilities is related to a 17% increase in the likelihood of a distressed pension plan termination. This effect is robust to accounting for firm unionization. In Model 4, the sample of 78 firms with information on claim classes is considered. In that

[47]The results presented in Panel B of Table 3.7 remain unchanged if the logarithm of total firm employees from Compustat is included as an additional control variable.

specification, additional leverage is a positive determinant of plan terminations, while defined benefit claimants are not related to plan terminations. Since the results for Model 4 are based on less than half of the observations in the benchmark specification, these results should be interpreted with caution.

The last three models in Panel B present results using unfunded pension obligations as a proxy for the role of defined benefit claimants in bankruptcy. Model 5 shows that the unfunded portion of pension obligations relative to overall liabilities is related to a higher likelihood of distressed pension plan terminations. However, the effect is only significant at the 10% level and disappears when I include the union dummy. The results at the firm level are consistent with those at the plan level: a higher ratio of defined benefit liabilities to adjusted liabilities is associated with a higher likelihood that the firm terminates at least one pension plan in bankruptcy.

Altogether, the results in Table 3.7 provide evidence of a relationship between defined benefit claimants and pension plan terminations in bankruptcy. The strong association between defined benefit obligations and distressed plan terminations implies a role for defined benefit claimants above and beyond the influence of the firm's other lenders. In addition, the results suggest that plan terminations may be one concession defined benefit claimants may have to agree to in bankruptcy. This finding is consistent with the previous essay's argument that defined benefit claimants have high incentives to avoid bankruptcy because of the option to have their plans terminated in Chapter 11. Pension claimants expect that they may have to bargain with the firm about the plan's survival and eventually may have to agree to plan terminations, so defined benefit claimants have stronger incentives to avoid bankruptcy than traditional lenders.

3.7 Likelihood to Refile for Chapter 11

My next question of interest is the extent to which defined benefit claimants and the actions they take in bankruptcy predict the firm's post-reorganization survival. The motivation for this test comes from the previous essay's findings. In particular, in Chapter 2 I documented that defined benefit claimants are less likely to file for

bankruptcy. As an extension, it can be expected that defined benefit claimants will also be related to a lower likelihood that firms refile for Chapter 11, since this is just the likelihood of bankruptcy after having emerged from reorganization once.

3.7.1 Regression Specification

I cannot measure post-Chapter 11 performance for firms which are liquidated or acquired in bankruptcy. For that reason, when I study the probability of refiling I examine only the firms which emerge from Chapter 11 as independent publicly traded companies. I test the extent to which the likelihood that firms refile for bankruptcy is driven by pension claimants and their actions.

To capture the determinants of refiling for Chapter 11, I use the same variables as the controls for the other outcomes of bankruptcy, duration and emergence. However, I include both the variables as measured in the year prior to bankruptcy and their changes during Chapter 11. Changes in reorganization are measured as the difference between firm characteristics in the first fiscal year after the firm emerges from bankruptcy and characteristics at the last fiscal year prior to bankruptcy. In particular, I consider whether changes in firm size, leverage, and pension obligations following the Chapter 11 reorganization influence the probability of refiling for bankruptcy. In this way, I capture whether pre-bankruptcy characteristics and the actions taken in bankruptcy influence the likelihood that firms end up in Chapter 11 again. In particular, I test the following model:

$$\begin{aligned} Refile_i = \alpha_0 + \alpha_1 \frac{\Delta DB\ Liabilities}{Adjusted\ Assets}_i + \alpha_2 \Delta Ln(Adjusted\ Assets)_i + \\ + \alpha_3 \Delta Leverage_i + \alpha_4 \Delta Additional\ Leverage_i + \beta_i X_i + \varepsilon_i \end{aligned} \tag{3.3}$$

where X is the vector of control variables included in equation (3.1) measured in the last fiscal year prior to bankruptcy and Δ represents the change in the variables of interest from the year after Chapter 11 emergence to the year prior to bankruptcy.

3.7.2 Determinants of the Likelihood to Refile

The results on the likelihood of refiling for bankruptcy are presented in Table 3.8. I estimate equation (3.3) in the sample of 64 bankrupt defined benefit sponsors with information at both the last fiscal year prior to bankruptcy and the first fiscal year after the firm emerges from bankruptcy. Fifteen of the firms in this subsample refile for Chapter 11 after emerging. The dependent variable is an indicator variable equal to one if a firm refiles for bankruptcy after having emerged from Chapter 11, and zero otherwise. The independent variables include the firm and bankruptcy characteristics and changes in those characteristics after emerging relative to prior to bankruptcy.

The first model in Table 3.8 presents results for the benchmark regression. The main determinants of whether firms refile for Chapter 11 include changes in additional leverage and cash flow volatility. In particular, firms which reduce their indebtedness in bankruptcy, as measured by additional liabilities, are less likely to refile for Chapter 11. Moreover, firms with more volatile cash flows prior to the original Chapter 11 filing are also less likely to file for bankruptcy in the future.

Models 2 to 5 in Table 3.8 add the ratio of pension obligations to overall liabilities and changes in this ratio to the benchmark specification. The results from Model 2 show that beyond the benchmark controls, firms with more defined benefit claimants relative to all lenders are less likely to refile for bankruptcy. In particular, a one standard deviation increase in the ratio of defined benefit obligations to overall liabilities is associated with a 15% decrease in the likelihood that the firm refiles for Chapter 11. The effect is economically meaningful given that the average likelihood of refiling for bankruptcy in the sample is 23%. Accounting for firm unionization levels (Model 3) does not alter the conclusions about the role of defined benefit claimants on the likelihood of refiling.

Model 4 accounts for changes in the pension obligation after emergence relative to prior to bankruptcy. As the results from that specification show, while defined benefit claimants play a role in the likelihood of refiling for bankruptcy, changes in the pension obligations do not influence the probability of refiling. Once again, accounting for unionization status does not change the findings discussed thus far (model 5). These results are consistent with the findings from the previous

chapter that firms with more defined benefit claimants relative to all lenders are less likely to file for bankruptcy.

To determine if the unfunded portion of defined benefit liabilities relates to the likelihood of refiling for bankruptcy, the last four columns in Table 3.8 focus on the ratio of unfunded pension obligations to overall liabilities. The results from Model 6 indicate that firms with more unfunded defined benefit obligations relative to all firm liabilities are less likely to refile for bankruptcy. A one standard deviation increase in the ratio of unfunded pension obligations to adjusted liabilities is related to a 12% decline in the probability of refiling for bankruptcy. Once again, union representation does not impact the likelihood that firms refile for Chapter 11 (model 7).

The last two models in Table 3.8 report results from including both the level of unfunded pension obligations and the change in unfunded obligations to the specification. The unfunded portion of pension obligation relative to overall liabilities remains a negative and significant predictor of the probability of refiling for bankruptcy. At the same time, firms that emerge with more unfunded liabilities relative to when they entered bankruptcy are less likely to refile for Chapter 11 in the future. While this result may seem counterintuitive, it could imply that regardless of whether their pension obligations are funded or not, defined benefit claimants are less likely to refile for bankruptcy. The last specification confirms that firms' unionization status does not influence the probability of refiling for Chapter 11.

Overall, the results presented in this subsection indicate that defined benefit claimants influence firms' post-reorganization performance. Whenever pension obligations represent a larger portion of the firm's overall liabilities upon filing for bankruptcy, firms are less likely to refile for Chapter 11 in the future. Even further, the results in Table 3.8 provide additional support for the earlier tests that showed that firms with larger defined benefit claimants relative to other lenders are less likely to file for Chapter 11 bankruptcy. In the tests presented in this section, I find that firms with more defined benefit claimants are less likely to refile for bankruptcy.

3.8 Unsecured Creditors' Recovery Rates

One additional outcome of the bankruptcy process that defined benefit claimants may influence is the unsecured creditors' recovery rates. Studying recovery rates is relevant because these rates indicate how much of their investment creditors gave up in bankruptcy. Unsecured creditors' recovery rates are of particular interest in this essay because defined benefit claimants are typically members of the unsecured creditors' committee. As a result, pension claimants will have the strongest impact on the amounts recovered by unsecured creditors. As unsecured lenders in bankruptcy, pension claimants may negotiate with the firm and take actions which influence the overall unsecured creditors' recovery rates. At the same time, pension claimants may not impact creditors' recoveries if they are not powerful enough or if they do not negotiate with the firm more than the other lenders. Therefore, in this section I investigate whether defined benefit claimants influence the ability of the firm's unsecured creditors to recover their investment in the bankrupt firm.

3.8.1 Regression Specification

The literature has documented various determinants of creditors' recovery rates. Following Jankowitsch, Nagler, and Subrahmanyam (2014), I account for firms' financial condition by using the market value of equity over adjusted assets. Structural credit risk models use the value of equity to infer the company's asset value and to define the leverage. In addition, I calculate the firm's default barrier as defined by Moody's Analytics. As in Jankowitsch et al. (2014), I control for long-term debt issuance by the ratio of long-term debt to total debt. Moreover, I include asset tangibility, profitability, firm size and the number of employees in the model as those variables have been found to influence recovery rates. Along with these determinants of creditor recovery rates, I consider the ratio of defined benefit liabilities to adjusted liabilities. Thus, I estimate the following specification:

$$
\begin{aligned}
Recovery\ Rate_{it} = \alpha_0 + \alpha_1 \left(\frac{DB\ Liabilities}{Adjusted\ Liabilities} \right)_{it-1} + \alpha_2 Equity_{it-1} + \\
+ \alpha_3 Default\ Barrier_{it-1} + \alpha_4 LTD\ Issuance_{it-1} + \\
+ \alpha_5 Asset\ Tangibility_{it-1} + \alpha_6 Profitability_{it-1} + \\
+ \alpha_7 Ln(Adj.\ Assets)_{it-1} + \alpha_8 Ln(Employees)_{it-1} + \varepsilon_{it-1}
\end{aligned}
\tag{3.4}
$$

Once again, I also consider whether the unfunded portion of defined benefit obligations impacts unsecured creditors' recovery rates.

3.8.2 Determinants of Unsecured Creditors' Recovery Rates

I estimate equation (3.4) on the sample of 32 firm-year observations with data on creditor recovery rates from Capital IQ. The results are presented in Table 3.9. The dependent variable equals the total unsecured creditors' recovery rate upon bankruptcy emergence.

Model 1 presents regression results including the variables commonly used to explain creditor recovery rates in the literature. The results indicate that equity value is the strongest predictor of unsecured lenders' recovery rates in my sample: the higher the equity value, the lower the unsecured creditors' recovery rate. In Model 2, I test whether defined benefit claimants impact the recovery rates for unsecured creditors. The results confirm the existence of a relationship between defined benefit claimants and recovery rates: a higher ratio of pension obligations to adjusted liabilities is associated with higher recovery rates for unsecured creditors. In terms of economic significance, a one standard deviation change in the ratio of pension liabilities to overall liabilities is associated with a 6% increase in recovery rates. Such an effect is meaningful given that the sample average unsecured creditors' recovery rate is 40%. The results from Model 3 indicate that the relationship does not carry over to the unfunded portion of pension liabilities to adjusted liabilities[48].

[48]Untabulated tests confirm that the results presented in Table 3.9 remain unchanged when firm unionization rates are considered. Firm unionization does not impact unsecured creditors' recovery rates and accounting for unions does not influence the role of defined benefit claimants on unsecured

There are several possible explanations for the positive relationship between unsecured creditors' recovery rates and the ratio of defined benefit liabilities to overall liabilities. One possibility is that firms with a high proportion of pension obligations relative to adjusted liabilities are more likely to terminate their pension plan, thus leaving more for other unsecured claimants to recover. Another explanation is that a higher ratio of pension obligations to adjusted liabilities indicates that there are fewer claimants to bargain with, and improved negotiations may lead to higher recovery rates for unsecured claimants. While the few data points in my sample prohibit me from differentiating among these channels, the results in Table 3.9 suggest that defined benefit claimants may play a role in creditors' recoveries beyond the influence of traditional lenders.

3.9 Changes in Pension Benefits During Bankruptcy

One possible channel through which defined benefit claimants may influence the bankruptcy restructuring process is through bargaining about their pension benefits. To test if this is one of the mechanisms at play, I consider whether defined benefit claimants are related to changes in the pension obligation during bankruptcy. A reduction in the defined benefit obligation may indicate that pension claimants accepted concessions to help the firm reorganize. However, all unsecured creditors usually suffer losses in bankruptcy, so at least part of the decline, if not the entire reduction in pension benefits, may be explained by the concessions taken by all firm creditors. For that reason, when I study changes in pension liabilities throughout Chapter 11, I control for the expected reductions in bankruptcy and consider whether pension claimants have any additional role in explaining the reductions in their liabilities beyond the expected losses.

3.9.1 Regression Specification

To account for the expected reductions that creditors experience in bankruptcy, I include the change in financial liabilities over the bankruptcy period in my re-

creditors' recovery rates.

gression specifications. The change in leverage is measured as the difference in financial liabilities from the year after emerging to the year prior to bankruptcy scaled by adjusted assets in the year prior to Chapter 11. The change in leverage is meant to approximate the average cut in liabilities that a firm's creditors experience as a result of bankruptcy. After controlling for the expected reduction in liabilities, I consider whether defined benefit claimants exert any additional influence on the changes in their obligation in bankruptcy. The regression specification is estimated as follows:

$$\begin{aligned}\frac{\Delta DB\ Liabilities}{Adjusted\ Assets} = \alpha_0 + \alpha_1 \left(\frac{DB\ Liabilities}{Adjusted\ Liabilities}\right)_{it-1} + \\ + \alpha_1 Ln(Adj.\ Assets)_{it-1} + \alpha_2 Leverage_{it-1} + \alpha_3 \Delta Leverage + \\ + \alpha_4 Employees_{it-1} + \alpha_5 \Delta Employees + \varepsilon_{it-1}\end{aligned} \tag{3.5}$$

where the dependent variable is the change in pension liabilities over the bankruptcy process, measured as the difference between defined benefit obligations upon bankruptcy emergence and the pension obligations prior to filing for bankruptcy, scaled by adjusted assets in the year prior to bankruptcy. All changes in the other control variables presented are measured in the same way. The implicit assumption in this model is that financial liabilities are similar to defined benefit obligations and reductions in the financial obligations capture the expected reduction in pension obligations.

One reason why pension claimants may explain changes in pension obligations above and beyond creditors' expected losses in bankruptcy is that defined benefit claimants influence the decision to terminate a pension plan, as discussed above. In particular, if a pension plan is terminated in bankruptcy, defined benefit obligations are expected to decline. Therefore, pension claimants may influence the reduction in pension obligations through their relationship to plan terminations. To ensure I am not capturing the termination effect when I study changes in pension obligations, I re-estimate equation (3.5) by including a control for plan terminations. The inclusion of the termination dummy reduces the sample size to 39 observations

because of missing information on the plan termination variable.

3.9.2 Determinants of Changes in Pension Benefits in Bankruptcy

I study pension benefit concessions as one of the channels through which defined benefit claimants may influence various characteristics and outcomes of the bankruptcy process. Table 3.10 reports the results from estimating equation (3.5) on the sample of 62 bankrupt defined benefit sponsors with data after bankruptcy emergence[49]. The dependent variable in all specifications is the difference between defined benefit pension obligations upon bankruptcy emergence and the pension obligations prior to filing for bankruptcy, scaled by adjusted assets in the year prior to bankruptcy.

In the first model of Table 3.10 I consider whether firm size, leverage, changes in the leverage, the number of employees and changes in the number of employees determine changes in the defined benefit pension liabilities during bankruptcy. As column (1) shows, none of the control variables are significantly related to changes in pension obligations. Model (2) introduces the ratio of defined benefit obligations to adjusted liabilities as an additional control. The ratio does not explain changes in the pension liabilities over the course of bankruptcy either. The lack of significance of the ratio suggests that defined benefit claimants do not explain changes in the pension obligations throughout the Chapter 11 process.

Model (3) in Table 3.10 tests whether the unfunded portion of pension liabilities relative to overall liabilities can explain changes in pension obligations during bankruptcy. Several of the control variables in the specification provide explanatory power. First, high firm leverage in the year before bankruptcy helps explain changes in pension obligations in bankruptcy. In particular, firms that are more levered upon bankruptcy filing are less likely to reduce their pension obligations in reorganization. Second, changes in firm financial leverage are related to changes in pension liabilities. Not surprisingly, firms that reduce their financial liabilities in bankruptcy also reduce their defined benefit liabilities in reorganization. Third, changes in the number of firm employees are related to changes in the pension

[49]The sample size in this estimation drops from 64 in the earlier specification (Table 3.8) to 62 in this model because of 2 firms with missing information on the number of employees.

obligations. Firms that reduce their workforce upon bankruptcy emergence also experience a decline in their defined benefit obligations.

Controlling for firms characteristics and their changes, I find that the unfunded portion of defined benefit liabilities to overall liabilities is a significant determinant of changes in pension obligations in bankruptcy. In particular, higher unfunded pension obligations relative to all firm liabilities are related to higher reductions in the defined benefit obligations after bankruptcy. Since I already control for the expected reductions in liabilities due to the bankruptcy reorganization, the significant ratio of unfunded pension liabilities to adjusted liabilities suggests an influence of pension claimants above that of traditional lenders.

The last three models in Table 3.10 present results for the 39 bankrupt defined benefit sponsors with information on plan termination and with data after bankruptcy emergence. In these specifications, I check if the results presented in the first three column are driven by plans which were terminated in bankruptcy. A plan termination will mechanically reduce the pension liabilities after bankruptcy relative to those before Chapter 11. This effect could be captured by the proxy for the role of defined benefit claimants as the ratio of defined benefit obligations to overall liabilities is related to the likelihood of plan terminations. As the results in Table 3.10 show, the ratio of unfunded pension obligations to overall liabilities remains a significant determinant of changes in the pension obligations after controlling for plan terminations. Therefore, plan terminations do not explain the entire reduction in defined benefit obligations in bankruptcy.

Overall, the results from Table 3.10 provide evidence that defined benefit claimants influence bankruptcy reorganization beyond the impact of traditional lenders. One of the mechanisms through which pension claimants impact the reorganization is by accepting cuts in their liabilities. The change in leverage variable is meant to capture the expected reduction in liabilities as a result of the bankruptcy reorganization. Therefore, any remaining explanatory power that pension obligations have is an impact above the average reduction in liabilities that traditional creditors take in bankruptcy. The reductions that pension claimants agree to can be explained in part by the expected liability reductions in bankruptcy, but they are largely determined by the ratio of pension claimants with higher unfunded liabilities relative to overall liabilities.

In this essay, I document that one channel through which defined benefit claimants influence the restructuring process is through agreeing to pension cuts. The fact that this mechanism is only at work for unfunded pension obligations is consistent with previous findings that pension claimants give up the most when they stand to lose the most. In a study of bargaining between management and labor in distressed airlines, Benmelech et al. (2012) show that management threatens labor with plan terminations and obtains the highest concessions from those labor unions which would incur the highest losses of plan terminations in bankruptcy- the pilots. While I cannot provide such detailed evidence as Benmelech et al. (2012), my findings are consistent with their results as I find that pension beneficiaries with unfunded pension plans stand to lose the most and also give up the most in bankruptcy.

3.10 Conclusion

In this essay, I investigate whether defined benefit claimants in Chapter 11 influence the bankruptcy restructuring process. Given the similarities and differences between pension claimants and traditional firm creditors, defined benefit claimants may influence the reorganization process but they may also negotiate with the firm similarly to other lenders, thus not playing a discernible role in bankruptcy. To determine if pension claimants impact the reorganization process above and beyond the role of traditional lenders, I control for all firm liabilities and study the ratio of pension obligations to overall liabilities as a measure of the relative influence of defined benefit claimants. While they do not impact the bankruptcy duration or the likelihood of emergence differently from other lenders, defined benefit claimants influence other aspects of the Chapter 11 reorganization. In particular, defined benefit claimants are positively related to the likelihood that a pension plan is terminated in bankruptcy. This result supports the argument in the first essay that defined benefit claimants foresee negotiations about plan terminations in bankruptcy and want to avoid them by negotiating with the firm outside of Chapter 11.

Along with the termination decision, defined benefit claimants influence the likelihood that firms refile for Chapter 11 bankruptcy. Consistent with the first

essay's results, I find that once they are out of bankruptcy, pension claimants are again associated with a lower likelihood of filing for Chapter 11. I also provide some indication of a positive relationship between defined benefit claimants, who are typically unsecured creditors in bankruptcy, and unsecured creditors' recovery rates.

Last, I try to shed light on the possible channels through which defined benefit claimants influence the bankruptcy reorganization process. One natural candidate for the mechanism through which defined benefit claimants influence the reorganization process is their willingness to accept reductions in pension benefits. However, since most unsecured creditors experience some loss in bankruptcy, I attempt to control for the expected change in the pension liabilities and consider the role of pension claimants above the predicted losses. I find that defined benefit claimants influence changes in their obligations. This effect is present for the unfunded portion of pension liabilities relative to overall liabilities, which suggests that defined benefit claimants experience the largest cuts in bankruptcy whenever they stand to lose the most in Chapter 11.

The collective results in this essay indicate a role for defined benefit claimants above and beyond the influence of the firm's other lenders. While defined benefit claimants may not impact all bankruptcy outcomes, they are relevant for certain important features of the reorganization process. Therefore, the role of defined benefit claimants should be considered when bankruptcy outcomes are examined.

Figures and Tables

Figure 3.1: Changes in Pension Variables Before and After Bankruptcy

This figure shows the evolution of the average defined benefit pension obligations (PBO) and the average pension assets (PPA) from two years prior to bankruptcy to two years after emerging from Chapter 11. Thus, year 1 in the figure refers to the first year after Chapter 11 emergence. The statistics are based on data from 64 defined benefit sponsors with information in both the last year before bankruptcy and the first year after emergence.

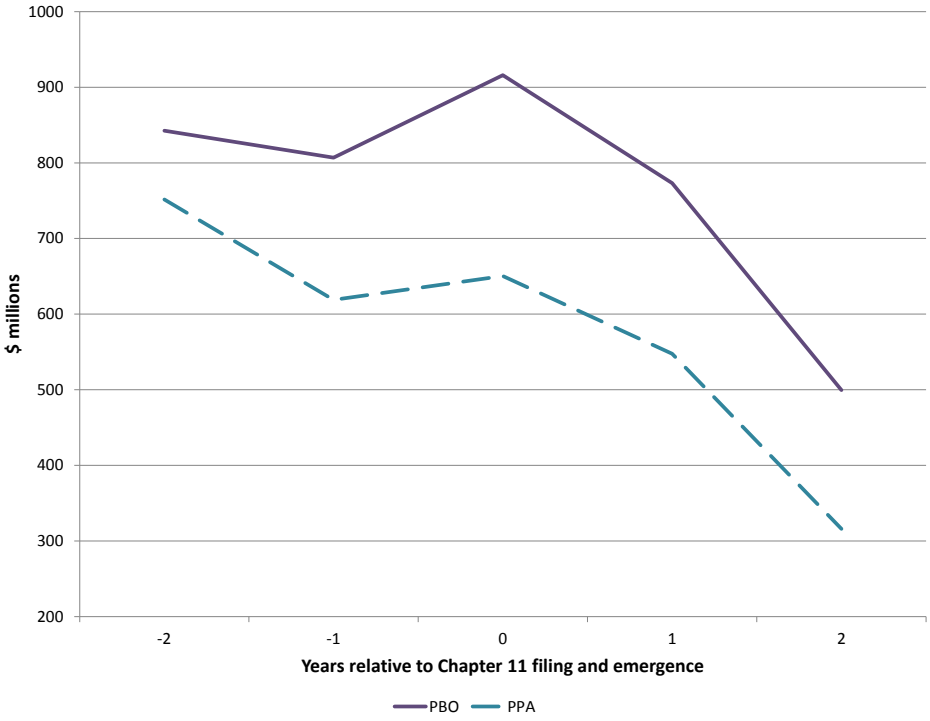

Table 3.1: Variable Definitions

This table provides definitions for the variables used in this study and the data sources from which variables were obtained. When available, Compustat data items are included in brackets. Note that due to the Compustat naming convention, the same variable name, pcppao, refers to different variables over time. Prior to 1998, pcppao refers to the pension cost for overfunded plans. Between 1998 and 2006, a positive value of pcppao refers to the prepaid pension cost, while a negative value of pcppa refers to the accrued pension cost. After 2006, pcppao refers to plan funding status.

Variable	Definition	Source
Active Share of Employees	Standard deviation of quarterly operating income (oibdpq) over previous 12 quarters scaled by total assets (at)	Form 5500
Additional Leverage	[Adjusted Liabilities - short-term debt (dlc) - long-term debt (dltt)]/ Adjusted Assets	Compustat
Adjusted Assets	If 1987 <= fiscal year <= 1997 and pcppao > 0, use Total assets (at) + DB assets + Operating lease - Prepaid pension cost (pcppao) - Underfunded prepaid pension cost (pcppau) If 1998 <= fiscal year <= 2006 and pcppao > 0, use Total assets (at) + DB assets + Operating lease - Prepaid pension cost (pcppao) If 2007 <= fiscal year and funded status > 0, use Total assets (at) + DB assets + Operating lease - Funded status (pcppao)	Compustat
Adjusted Liabilities	If 1987 <= fiscal year <= 1997 and pcppao < 0, use Total liabilities (lt) + DB liabilities + Operating lease - abs(Accrued pension cost (pcppao)) - abs(Underfunded accrued pension cost (pcppau)) If 1998 <= fiscal year <= 2006 and pcppao < 0, use Total liabilities (lt) + DB liabilities + Operating lease - abs(Accrued pension cost (pcppao)) If 2007 <= fiscal year and funded status < 0, use Total liabilities (lt) + DB liabilities + Operating lease - abs(Funded status (pcppao))	Compustat
Asset Tangibility	Net property, plant, and equipment (ppent) / Adjusted Assets	Compustat
Assets	Total assets (at)	Compustat
Cash	Cash and short-term investments (che) / Adjusted assets	Compustat
Cash Flow Volatility	Standard deviation of quarterly operating income (oibdpq) over previous 12 quarters scaled by adjusted assets	Compustat
Claim Classes	The number of claim classes identified on the bankruptcy reorganization plan	Form 8K
Default Barrier	(Short-term debt (dlc) + 0.5*long-term debt (dltt)) / Adjusted Assets	Compustat
Delaware	Dummy = 1 if the Chapter 11 case was filed in the state of Delaware, and 0 otherwise	BRD
Duration	Number of months in bankruptcy, from the date of filing to the date of plan confirmation	BRD
Emerge	Dummy = 1 if the bankrupt firm emerges from bankruptcy, and 0 otherwise	8K, BRD, Factiva
Employees	The number of employees (emp)	Compustat
Equity	Market value of equity / Adjusted Assets	Compustat
Firm Age	The number of years since the firm first reports on Compustat	Compustat
Leverage	(Short-term debt (dlc) + long-term debt (dltt)) / Adjusted Assets	Compustat
LTD Issuance	Long-term debt (dltt) / Short-term debt (dlc) + long-term debt (dltt)	Compustat
DB Liabilities (PBO)	If 1987<=fiscal year<=1997, Pension benefit projected obligation (pbpro)+Underfunded pension benefit projected obligation (pbpru) If fiscal year >= 1998, Pension benefit projected obligation (pbpro)	Compustat, Form 5500
Plan Age	The number of years since the defined benefit plan became effective	Form 5500
DB Assets (PPA)	If 1987 <= fiscal year <= 1997, Pension plan assets (pplao) + Underfunded pension plan assets (pplau) If fiscal year >= 1998, Pension plan assets (pplao)	Compustat, Form 5500
Prepackaged	Dummy = 1 if a bankruptcy is prepackaged or prenegotiated	BRD
Recovery Rate	Unsecured creditors' recovery rates	Capital IQ
Refile	Dummy = 1 if the bankrupt firm refiles for bankruptcy, and 0 otherwise	BRD
Return on Assets	Operating income before depreciation (oibdp) / Adjusted Assets	Compustat
Terminate	Dummy = 1 if the firm terminates at least one defined benefit pension plan in bankruptcy, and 0 otherwise	PBGC, Form 5500
Union	Dummy = 1 if at least one of the firm's defined benefit pension plans is represented by a union, and 0 otherwise	Form 5500, 8K/10K

Table 3.2: Sample Selection

This table reports statistics for the sample of 236 bankrupt defined benefit sponsors from 1987 to 2012. Panel A outlines the steps taken to construct the sample and the remaining number of firms in the sample after each step is applied. Pension and financial data are obtained from Compustat. Chapter 11 filings are identified using Lynn LoPucki's Bankruptcy Research Database (BRD). Panel B reports the industry distribution of sample firms based on the Fama and French 48-industry classification. The panel lists the industry name, the number of firms in that industry, and the percent of firms in the industry relative to the 236 firms in the sample. Industries are ranked from highest representation in the sample to lowest.

Panel A: Sample Selection

	Sample
Number of firms from Compustat Pension Annual data from 1987 to 2012	8874
with data on DB assets and liabilities	5695
with all control variables on Compustat	2005
filed for Chapter 11	244
with data at most two years prior to Chapter 11	236

Panel B: Industry Affiliation

Industry	N	%	Industry	N	%
Retail	37	16%	Food Products	5	2%
Transportation	18	8%	Entertainment	5	2%
Steel Works Etc	16	7%	Fabricated Products	5	2%
Automobiles and Trucks	16	7%	Electrical Equipment	5	2%
Textiles	14	6%	Computers	3	1%
Consumer Goods	11	5%	Electronic Equipment	3	1%
Chemicals	11	5%	Coal	2	1%
Machinery	11	5%	Petroleum and Natural Gas	2	1%
Apparel	9	4%	Personal Services	2	1%
Rubber and Plastic Products	9	4%	Other	2	1%
Business Services	9	4%	Recreation	1	0%
Business Supplies	9	4%	Healthcare	1	0%
Printing and Publishing	7	3%	Non-Metallic Mining	1	0%
Construction Materials	7	3%	Measuring Equipment	1	0%
Wholesale	7	3%	Shipping Containers	1	0%
Construction	6	3%	All	236	100%

Table 3.3: Summary Statistics

This table reports summary statistics for the main sample of 236 bankrupt defined benefit sponsors from 1987 to 2012 as well as for several subsamples used in this paper. Panel A reports firm characteristics, defined benefit pension plan characteristics, and bankruptcy characteristics for the main sample of 236 bankrupt defined benefit sponsors. Panel B reports summary statistics for the subsample of 107 defined benefit sponsors for which information on the number of claim classes in bankruptcy was obtained. Panel C presents summary statistics at the plan level for the subsample of 83 defined benefit sponsors (176 plan-years) with data on Form 5500. Panel D provides summary statistics for the subsample of 32 defined benefit sponsors for which data on unsecured creditors' recovery rates was available on Capital IQ. All variables are defined in Table 3.1.

Panel A: Main Sample

	N	Mean	StDev	Min	25th	Median	75th	Max
Firm Characteristics								
Assets	236	1,701	4620	161.8	273.5	500.4	1,545	55,002
Adjusted Assets	236	2,139	6,431	174.8	311.1	589.2	1639	78,625
Leverage	236	0.446	0.342	0	0.247	0.388	0.590	3.532
Additional Leverage	236	0.573	0.230	0.058	0.417	0.544	0.727	1.814
Cash	236	0.035	0.041	0	0.007	0.02	0.047	0.228
Cash Flow Volatility	236	0.018	0.014	0.002	0.009	0.014	0.023	0.085
Asset Tangibility	236	0.252	0.156	0.015	0.132	0.232	0.348	0.808
Return on Assets	236	0.040	0.061	-0.164	0.001	0.041	0.074	0.485
Firm Age	236	25.35	16.51	3	10	20	41	62
Employees	230	13.04	26.64	0.031	2.500	5.225	14.70	252.0
Union	176	0.602	0.491	0	0	1	1	1
Pension Plan Characteristics								
DB Assets/Adj. Assets	236	0.109	0.118	0	0.023	0.077	0.147	0.569
DB Liab./Adj. Assets	236	0.131	0.141	0.002	0.027	0.086	0.164	0.775
DB Liab./Adj. Liabilities	236	0.128	0.13	0.003	0.03	0.085	0.169	0.590
(DB Liab.-DB Assets)/Adj. Liabilities	236	0.020	0.053	-0.215	0	0.008	0.028	0.474
Bankruptcy Characteristics								
Terminate	172	0.581	0.495	0	0	1	1	1
Prepackaged	236	0.246	0.431	0	0	0	0	1
Delaware	236	0.390	0.489	0	0	0	1	1
Duration	236	20.03	17.17	0.667	8.133	16.85	25.82	131.8
Ln(Duration)	236	2.617	0.975	-0.405	2.096	2.824	3.251	4.882
Emerge	236	0.725	0.448	0	0	1	1	1
Refile	236	0.186	0.390	0	0	0	0	1
Claim Classes	107	9.953	6.371	3	7	9	11	62

Panel B: Claim Classes Subsample

	N	Mean	StDev	Min	25th Perc.	Median	75th Perc.	Max
Adjusted Assets	107	2,754	7,996	174.8	378.4	758.1	2,360	78,625
Leverage	107	0.480	0.440	0.014	0.246	0.393	0.592	3.532
Additional Leverage	107	0.598	0.206	0.145	0.441	0.566	0.748	1.191
Cash	107	0.035	0.040	0	0.007	0.019	0.05	0.194
Cash Flow Volatility	107	0.017	0.013	0.002	0.009	0.013	0.021	0.071
Asset Tangibility	107	0.253	0.140	0.015	0.146	0.239	0.355	0.729
Return on Assets	107	0.045	0.069	-0.102	0.005	0.040	0.074	0.485
Union	92	0.587	0.495	0	0	1	1	1
DB Liabilities / Adj. Liabilities	107	0.139	0.131	0.005	0.037	0.094	0.214	0.590
(DB Liab.-DB Assets)/Adj. Liabilities	107	0.023	0.048	-0.215	0.002	0.01	0.045	0.136
Terminate	78	0.385	0.490	0	0	0	1	1
Prepackaged	107	0.308	0.464	0	0	0	1	1
Delaware	107	0.467	0.501	0	0	0	1	1
Duration	107	18.97	18.95	0.667	7.300	16.07	22.53	131.8
Emerge	107	0.860	0.349	0	1	1	1	1
Refile	107	0.196	0.399	0	0	0	0	1

Panel C: Plan Level Subsample

	N	Mean	StDev	Min	25th Perc.	Median	75th Perc.	Max
Average # of Plans	90	1.911	2.882	1	1	1	2	26
Plan Age	165	28.77	17.37	2	15	27	42	78
Ln(DB Assets)	176	2.871	1.985	-2.398	1.607	2.559	3.973	8.164
DB Assets / Adj. Assets	176	0.050	0.090	0	0.003	0.016	0.051	0.656
DB Liabilities / Adj. Assets	176	0.060	0.107	0	0.004	0.019	0.060	0.740
(DB Assets-DB Liab.)/DB Liab.	176	-0.068	0.327	-0.668	-0.245	-0.127	0.045	2.025
DB Liabilities / Adj. Liabilities	176	0.056	0.094	0	0.004	0.018	0.060	0.502
(DB Liab.-DB Assets)/Adj. Liabilities	176	0.008	0.025	-0.085	0	0.001	0.008	0.169
Union	176	0.432	0.497	0	0	0	1	1
Employees	176	5.780	19.70	0	0.28	1.094	4.394	216.4
Active Share of Employees	176	0.324	0.294	0	0	0.302	0.512	1
Firm Age	176	32.33	18.195	5	13	33	51	56
Terminate	176	0.438	0.497	0	0	0	1	1
Claim Classes	103	8.670	3.014	4	8	8	10	20

Panel D: Recovery Rates Subsample

	N	Mean	StDev	Min	25th Perc.	Median	75th Perc.	Max
Recovery Rate	32	0.404	0.303	0.002	0.064	0.380	0.670	1
Adjusted Assets	32	3,053	4,264	188.0	469.9	1,264	3,676	19,464
Leverage	32	0.571	0.578	0.118	0.31	0.429	0.701	3.532
Additional Leverage	32	0.527	0.220	0.058	0.411	0.519	0.647	1.066
Asset Tangibility	32	0.267	0.167	0.015	0.126	0.282	0.395	0.631
Return on Assets	32	0.057	0.102	-0.164	0.010	0.060	0.084	0.485
Employees	32	14.27	21.29	0.038	2.140	4.850	16.500	80.11
DB Liabilities / Adj. Liabilities	32	0.133	0.129	0.007	0.033	0.101	0.196	0.590
(DB Liab.-DB Assets)/Adj. Liabilities	32	0.030	0.044	-0.046	0.003	0.014	0.046	0.127
Equity	32	0.091	0.147	0.003	0.014	0.046	0.099	0.751
Default Barrier	32	0.441	0.599	0.065	0.197	0.297	0.412	3.532
LTD Issuance	32	0.564	0.439	0	0.021	0.811	0.988	1

Panel E: Pairwise Correlation

This panel reports pairwise correlation coefficients among the variables used in the tests for the sample of 236 bankrupt defined benefit sponsors from 1987 to 2012. All variables are defined in Table 3.1. *p-values* are reported in brackets.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1)	Ln(Adj. Assets)	1.00																
(2)	Leverage	-0.17	1.00															
		(0.01)																
(3)	Additional Leverage	0.20	-0.37	1.00														
		(0.00)	(0.00)															
(4)	Cash	0.18	0.14	0.18	1.00													
		(0.01)	(0.03)	(0.01)														
(5)	Cash Flow Volatility	-0.20	0.03	0.05	0.06	1.00												
		(0.00)	(0.68)	(0.48)	(0.37)													
(6)	Asset Tangibility	-0.03	0.14	-0.33	-0.10	-0.15	1.00											
		(0.67)	(0.03)	(0.00)	(0.12)	(0.02)												
(7)	Return on Assets	0.04	0.52	-0.22	-0.00	-0.30	0.14	1.00										
		(0.50)	(0.00)	(0.00)	(0.99)	(0.00)	(0.03)											
(8)	Prepackaged	-0.15	0.30	-0.20	0.09	-0.09	-0.03	0.21	1.00									
		(0.02)	(0.00)	(0.00)	(0.18)	(0.18)	(0.64)	(0.00)										
(9)	Delaware	-0.01	0.03	-0.10	-0.04	-0.05	-0.01	0.10	0.09	1.00								
		(0.84)	(0.69)	(0.14)	(0.51)	(0.45)	(0.87)	(0.13)	(0.17)									
(10)	DB Liabilities / Adj. Liabilities	0.17	-0.30	0.46	-0.04	-0.14	-0.09	-0.15	-0.15	-0.13	1.00							
		(0.01)	(0.00)	(0.00)	(0.50)	(0.03)	(0.19)	(0.02)	(0.02)	(0.05)								
(11)	(DB Liab.-DB Assets)/Adj. Liabilities	0.01	-0.07	0.30	-0.01	-0.08	0.07	-0.09	-0.02	-0.16	0.41	1.00						
		(0.84)	(0.27)	(0.00)	(0.88)	(0.23)	(0.30)	(0.17)	(0.81)	(0.01)	(0.00)							
(12)	Union	0.18	0.06	-0.05	-0.05	-0.01	0.17	0.05	-0.01	-0.08	0.03	0.19	1.00					
		(0.02)	(0.43)	(0.55)	(0.53)	(0.85)	(0.03)	(0.53)	(0.92)	(0.26)	(0.67)	(0.01)						
(13)	Claim Classes	-0.00	-0.02	-0.10	-0.00	0.03	0.25	-0.06	-0.10	0.06	-0.10	-0.05	-0.14	1.00				
		(0.99)	(0.83)	(0.30)	(0.99)	(0.77)	(0.01)	(0.51)	(0.30)	(0.54)	(0.33)	(0.62)	(0.19)					
(14)	Duration	0.20	-0.26	0.15	-0.04	0.03	-0.01	-0.01	-0.46	-0.03	0.12	-0.12	-0.05	0.09	1.00			
		(0.00)	(0.00)	(0.02)	(0.57)	(0.70)	(0.86)	(0.87)	(0.00)	(0.61)	(0.08)	(0.06)	(0.52)	(0.35)				
(15)	Emerge	0.11	0.25	-0.09	0.07	-0.10	0.11	0.13	0.31	0.01	0.00	0.12	0.17	0.15	-0.15	1.00		
		(0.09)	(0.00)	(0.19)	(0.26)	(0.11)	(0.08)	(0.05)	(0.00)	(0.92)	(0.98)	(0.07)	(0.02)	(0.12)	(0.02)			
(16)	Terminate	-0.24	-0.29	0.11	-0.04	0.22	-0.06	-0.23	-0.22	-0.10	0.05	0.05	-0.16	-0.19	0.09	-0.61	1.00	
		(0.00)	(0.00)	(0.15)	(0.65)	(0.00)	(0.47)	(0.00)	(0.00)	(0.21)	(0.48)	(0.51)	(0.06)	(0.10)	(0.23)	(0.00)		
(17)	Refile	-0.11	0.06	-0.01	-0.05	-0.03	0.05	0.04	0.18	-0.03	-0.13	-0.05	0.04	-0.01	-0.09	0.27	-0.26	1.00
		(0.09)	(0.36)	(0.83)	(0.41)	(0.61)	(0.48)	(0.54)	(0.01)	(0.69)	(0.06)	(0.49)	(0.56)	(0.94)	(0.16)	(0.00)	(0.00)	

Table 3.4: Changes in Firm Variables- Before vs. After Bankruptcy

This table presents univariate comparisons of firm and plan characteristics between the last fiscal prior to the bankruptcy filing and the first fiscal year after bankruptcy emergence. The results are based on 64 defined benefit sponsors with information in both years. All univariate comparisons are based on median values. Reported *p-values* for significance of differences are based on Wilcoxon two-sample tests. All variables are defined in Table 3.1.

	T-1	T+1	z-stat	p-value
Firm Characteristics				
Ln(Assets)	7.388	6.845	1.78	0.0759
Leverage	0.481	0.261	5.21	0.0000
Additional Leverage	0.505	0.554	0.46	0.6490
Cash	0.024	0.044	2.44	0.0148
Cash Flow Volatility	0.012	0.012	0.04	0.9715
Asset Tangibility	0.252	0.211	1.48	0.1402
Return on Assets	0.063	0.063	1.45	0.1467
Plan Characteristics				
DB Liabilities	119.2	128.0	0.14	0.8920
DB Liabilities/Adj. Assets	0.104	0.143	1.58	0.1153
DB Assets	90.56	101.8	0.42	0.6732
DB Assets/Adj. Assets	0.094	0.108	0.99	0.3204
DB Liabilities/Adj. Liab.	0.101	0.163	3.22	0.0013
(DB Liab.-DB Assets)/Adj. Liab.	0.013	0.029	2.92	0.0035

Table 3.5: Determinants of Bankruptcy Duration

This table reports results from cross-sectional regressions of bankruptcy duration with industry and year fixed effects. The sample includes 236 defined benefit sponsors from 1987 to 2012, as well as two subsamples of sponsors with union and claim classification data. All variables are defined in Table 3.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the industry level.

Dependent Variable: *Duration*	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DB Liabilities/Adj. Liabilities		0.50	-0.06	0.17			
		(0.63)	(-0.05)	(0.19)			
(DB Liab.-DB Assets)/Adj.Liabilites					1.23	3.92	-2.62
					(1.06)	(1.63)	(-0.89)
Ln(Adj. Assets)	0.08*	0.07	0.15**	0.10	0.08*	0.15**	0.11
	(1.91)	(1.59)	(2.04)	(0.76)	(1.79)	(2.23)	(0.80)
Leverage	-0.67***	-0.63***	-0.89***	-0.89*	-0.67***	-0.95***	-0.83*
	(-3.31)	(-3.02)	(-3.04)	(-1.79)	(-3.24)	(-3.52)	(-1.96)
Additional Leverage	-0.13	-0.23	-0.09	0.45	-0.24	-0.48	0.83
	(-0.40)	(-0.66)	(-0.16)	(0.49)	(-0.70)	(-0.86)	(0.70)
Cash	0.73	0.92	1.03	-0.79	0.84	1.32	-1.38
	(0.59)	(0.73)	(0.63)	(-0.39)	(0.65)	(0.85)	(-0.60)
Cash Flow Volatility	6.07**	6.12**	10.48*	-1.57	6.19**	12.55**	-5.41
	(2.34)	(2.36)	(1.86)	(-0.12)	(2.35)	(2.06)	(-0.35)
Asset Tangibility	0.34	0.34	1.00	0.12	0.27	0.74	0.27
	(0.66)	(0.68)	(1.31)	(0.15)	(0.55)	(1.03)	(0.30)
Return on Assets	2.42**	2.40**	3.07***	4.16	2.44**	3.44***	3.69
	(2.45)	(2.49)	(2.82)	(1.35)	(2.51)	(3.52)	(1.34)
Prepackaged	-1.45***	-1.44***	-1.28***	-1.50***	-1.47***	-1.36***	-1.40***
	(-7.33)	(-7.30)	(-5.37)	(-5.21)	(-7.34)	(-5.63)	(-4.55)
Delaware	-0.30***	-0.29***	-0.36**	-0.18	-0.29**	-0.32**	-0.22
	(-2.84)	(-2.72)	(-2.45)	(-0.72)	(-2.72)	(-2.15)	(-1.09)
Union			-0.23**			-0.27**	
			(-2.04)			(-2.42)	
Claim Classes				-0.01			-0.01
				(-0.66)			(-0.51)
Intercept	2.72***	2.74***	2.16***	-0.27	2.82***	2.34***	-0.43
	(4.51)	(4.47)	(2.75)	(-0.20)	(4.38)	(3.18)	(-0.33)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	LPM	LPM	LPM	LPM	LPM	LPM	LPM
Observations	236	236	176	107	236	176	107
R-squared	0.68	0.68	0.71	0.82	0.68	0.72	0.83

Table 3.6: Likelihood to Emerge from Bankruptcy

This table reports results from cross-sectional regressions of the likelihood of emerging from bankruptcy with industry and year fixed effects. The sample includes 236 defined benefit sponsors from 1987 to 2012, as well as two subsamples of sponsors with union and claim classification data. All variables are defined in Table 3.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the industry level.

Dependent Variable: *Emerge*	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DB Liabilities/Adj. Liabilities		-0.02	0.09	0.22			
		(-0.04)	(0.17)	(0.39)			
(DB Liab.-DB Assets)/Adj. Liabilities					0.38	0.33	0.07
					(0.59)	(0.23)	(0.06)
Ln(Adj. Assets)	0.09***	0.09***	0.08**	0.09*	0.09***	0.09**	0.09*
	(2.82)	(3.07)	(2.33)	(1.76)	(2.79)	(2.14)	(1.76)
Leverage	0.31**	0.31*	0.23	0.17	0.31**	0.22	0.17
	(2.22)	(1.92)	(1.23)	(1.25)	(2.24)	(1.32)	(1.16)
Additional Leverage	0.09	0.10	0.03	0.01	0.06	0.02	0.00
	(0.61)	(0.56)	(0.15)	(0.05)	(0.32)	(0.09)	(0.01)
Cash	-0.84	-0.85	-1.21	-0.66	-0.81	-1.23	-0.65
	(-0.74)	(-0.78)	(-0.81)	(-0.66)	(-0.69)	(-0.75)	(-0.55)
Cash Flow Volatility	-1.10	-1.10	-0.01	4.50	-1.06	0.16	4.60
	(-0.52)	(-0.52)	(-0.00)	(0.69)	(-0.50)	(0.05)	(0.65)
Asset Tangibility	0.16	0.16	-0.17	0.35	0.14	-0.19	0.35
	(0.55)	(0.54)	(-0.57)	(0.52)	(0.46)	(-0.59)	(0.53)
Return on Assets	-0.84	-0.84	0.01	1.04	-0.83	0.06	1.05
	(-0.99)	(-0.98)	(0.01)	(0.71)	(-0.99)	(0.06)	(0.69)
Prepackaged	0.31***	0.31***	0.30***	0.26	0.30***	0.30***	0.26
	(3.60)	(3.58)	(3.26)	(1.60)	(3.30)	(2.81)	(1.66)
Delaware	0.04	0.04	0.06	0.17***	0.05	0.06	0.18**
	(0.65)	(0.63)	(0.88)	(3.07)	(0.71)	(0.92)	(2.73)
Union			0.14*			0.14*	
			(1.80)			(1.69)	
Claim Classes				0.01			0.01
				(1.11)			(1.13)
Intercept	0.22	0.22	0.29	0.12	0.25	0.30	0.13
	(0.66)	(0.67)	(0.92)	(0.16)	(0.70)	(0.80)	(0.17)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	LPM	LPM	LPM	LPM	LPM	LPM	LPM
Observations	236	236	176	107	236	176	107
R-squared	0.41	0.41	0.46	0.57	0.41	0.46	0.57

Table 3.7: Distressed Pension Plan Terminations

This table reports results from cross-sectional regressions of the likelihood to terminate a defined benefit pension plan in bankruptcy with year fixed effects. All variables are defined in Table 3.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the industry level.

Panel A: Likelihood of Defined Benefit Pension Plan Termination at the Plan Level

This panel reports results for the likelihood of defined benefit plan termination in bankruptcy using plan-level data from Form 5500. The sample includes 176 plan-year observations for 83 defined benefit sponsors from 1990 to 2007, as well as two subsamples of sponsors with union and claim classification data.

Dependent Variable: *Terminate*	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DB Liabilities/Adj. Liabilities		1.04**	1.05**	0.89**			
		(2.18)	(2.19)	(2.31)			
(DB Liab.-DB Assets)/Adj. Liabilities					2.35	2.17	1.67
					(1.40)	(1.23)	(0.73)
(DB Liab.-DB Assets)/DB Liab.	-0.01	-0.02	0.00	-0.20	0.05	0.07	-0.13
	(-0.07)	(-0.21)	(0.04)	(-1.36)	(0.49)	(0.62)	(-1.20)
Active share of participants	-0.01	0.03	0.02	0.01	0.01	-0.00	-0.01
	(-0.06)	(0.28)	(0.16)	(0.12)	(0.09)	(-0.01)	(-0.07)
DB Assets	0.00	0.00	0.00	0.00*	0.00	0.00	0.00
	(1.13)	(1.62)	(1.45)	(1.68)	(1.07)	(0.93)	(1.13)
Ln(DB Assets)	0.00	-0.03	-0.03	-0.04*	-0.00	-0.01	-0.02
	(0.09)	(-1.30)	(-1.50)	(-1.74)	(-0.23)	(-0.48)	(-1.07)
Leverage	-0.53***	-0.50***	-0.46***	-0.02	-0.57***	-0.52***	-0.09
	(-3.23)	(-3.10)	(-2.73)	(-0.18)	(-3.50)	(-3.10)	(-0.85)
Additional Leverage	0.07	-0.00	0.06	0.86***	-0.04	0.03	0.86***
	(0.28)	(-0.00)	(0.24)	(3.65)	(-0.14)	(0.13)	(3.28)
Union			0.13			0.10	
			(1.24)			(0.99)	
Claim Classes				-0.01			-0.01
				(-0.81)			(-0.76)
Intercept	0.33*	0.26	0.09	0.89***	0.36*	0.22	0.95***
	(1.75)	(1.38)	(0.43)	(6.36)	(1.85)	(0.95)	(5.68)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	LPM	LPM	LPM	LPM	LPM	LPM	LPM
Observations	176	176	172	103	176	172	103
Firm-years	91	91	88	45	91	88	48
R-squared	0.51	0.53	0.55	0.77	0.52	0.54	0.75

Panel B: Likelihood of Defined Benefit Pension Plan Termination at the Firm Level

This panel presents results for the likelihood of defined benefit plan termination in bankruptcy using firm-level data from Compustat. The sample consists of 171 firm-level observations for defined benefit sponsors from 1987 to 2012 for which information on plan termination was obtained, as well as two subsamples of sponsors with union and claim classification data.

Dependent Variable: *Terminate*	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DB Liabilities/Adj. Liabilities		1.27***	1.24**	0.33			
		(3.43)	(2.47)	(0.47)			
(DB Liab.-DB Assets)/Adj. Liabilities					1.34*	2.33	0.55
					(1.73)	(1.44)	(0.30)
(DB Liab.-DB Assets)/DB Liab.	-0.06	0.06	-0.04	0.03	0.10	0.09	0.07
	(-0.44)	(0.40)	(-0.18)	(0.11)	(0.56)	(0.29)	(0.24)
DB Assets	0.00	0.00	0.00*	0.00	0.00	0.00	0.00
	(1.30)	(1.60)	(1.76)	(1.55)	(1.25)	(1.40)	(1.49)
Ln(DB Assets)	-0.11***	-0.17***	-0.16***	-0.13***	-0.12***	-0.11***	-0.12***
	(-4.04)	(-5.22)	(-3.78)	(-2.76)	(-4.14)	(-2.96)	(-3.06)
Leverage	-0.71***	-0.60***	-0.68***	-0.37**	-0.71***	-0.80***	-0.39**
	(-4.76)	(-4.07)	(-3.93)	(-2.17)	(-4.95)	(-4.84)	(-2.14)
Additional Leverage	0.38*	0.24	0.21	0.99***	0.25	0.14	0.99***
	(1.70)	(1.08)	(0.80)	(3.27)	(1.06)	(0.44)	(2.87)
Union			-0.04			-0.07	
			(-0.44)			(-0.75)	
Claim Classes				-0.01			-0.01
				(-0.87)			(-0.83)
Intercept	0.83***	1.05***	1.05***	1.34***	0.92***	0.97***	1.34***
	(4.78)	(5.65)	(4.38)	(6.37)	(4.89)	(3.68)	(5.72)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	LPM	LPM	LPM	LPM	LPM	LPM	LPM
Observations	171	171	139	78	171	139	78
R-squared	0.35	0.41	0.42	0.57	0.36	0.39	0.56

Table 3.8: Likelihood to Refile for Chapter 11

This table reports results from cross-sectional regressions of the likelihood to refile for bankruptcy. The sample includes 64 defined benefit sponsors from 1987 to 2012 with information in the year prior to bankruptcy and in the year after emergence, as well as a subsample of 50 sponsors with unionization data. All variables are defined in Table 3.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the industry level.

Dependent Variable: *Refile*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DB Liabilities/Adj. Liabilities		-1.46***	-1.47***	-1.57***	-1.52***				
		(-3.00)	(-3.69)	(-3.07)	(-3.54)				
Change in DB Liab. / Adj. Assets				-1.06	-0.58				
				(-0.94)	(-0.41)				
(DB Liab.-DB Assets) / Adj. Liabilities						-3.70***	-4.28**	-5.12***	-5.67***
						(-3.09)	(-2.68)	(-4.49)	(-2.98)
Change in (DB Liab.-DB Assets)/Adj. Assets								-3.90**	-4.42**
								(-2.58)	(-2.60)
Ln(Adj. Assets)	-0.08	-0.05	-0.07	-0.06	-0.07	-0.06	-0.07	-0.04	-0.02
	(-1.69)	(-1.15)	(-1.03)	(-1.40)	(-1.11)	(-1.10)	(-0.99)	(-0.69)	(-0.30)
Change in Ln(Adj. Assets)	-0.14	-0.16	-0.40	-0.13	-0.37	-0.11	-0.29	-0.20	-0.45
	(-0.64)	(-0.73)	(-1.34)	(-0.62)	(-1.19)	(-0.51)	(-0.88)	(-1.00)	(-1.48)
Leverage	-0.64	-0.64	0.07	-0.73	-0.00	-0.57	0.09	-0.42	0.35
	(-1.12)	(-1.16)	(0.10)	(-1.25)	(-0.00)	(-1.14)	(0.14)	(-0.92)	(0.58)
Change in Leverage	-0.44	-0.45	0.36	-0.50	0.30	-0.36	0.40	-0.23	0.57
	(-0.77)	(-0.81)	(0.46)	(-0.86)	(0.35)	(-0.71)	(0.56)	(-0.52)	(0.91)
Additional Leverage	0.50	0.79**	1.39**	0.79**	1.38**	0.69	1.31**	0.81*	1.45**
	(1.12)	(2.27)	(2.61)	(2.15)	(2.50)	(1.45)	(2.25)	(1.79)	(2.49)
Change in Additional Leverage	0.78*	1.02**	1.07	1.25**	1.21*	0.76*	0.84	1.12**	1.43**
	(1.89)	(2.06)	(1.66)	(2.28)	(1.79)	(1.83)	(1.43)	(2.55)	(2.42)
Cash	-0.35	-0.55	-1.51	-0.42	-1.38	-0.49	-1.28	-0.69	-1.77
	(-0.36)	(-0.64)	(-1.40)	(-0.48)	(-1.21)	(-0.51)	(-1.21)	(-0.71)	(-1.47)
Cash Flow Volatility	-6.10**	-6.90**	-16.80**	-7.16**	-17.22**	-6.30**	-16.77**	-7.51**	-18.83***
	(-2.22)	(-2.17)	(-2.58)	(-2.16)	(-2.66)	(-2.29)	(-2.85)	(-2.69)	(-3.36)
Asset Tangibility	0.27	0.25	-0.12	0.25	-0.10	0.31	-0.09	0.32	-0.18
	(0.68)	(0.67)	(-0.25)	(0.66)	(-0.20)	(0.72)	(-0.16)	(0.70)	(-0.32)
Return on Assets	2.09	1.62	2.02	1.80	2.12	1.64	1.82	1.70	1.74
	(1.47)	(1.28)	(1.24)	(1.37)	(1.26)	(1.18)	(0.95)	(1.13)	(0.82)
Duration	-0.00	0.00	-0.00	0.00	-0.00	-0.00	-0.01	-0.00	-0.00
	(-0.15)	(0.17)	(-0.78)	(0.36)	(-0.68)	(-0.45)	(-1.32)	(-0.31)	(-1.00)
Union			0.13		0.14		0.20		0.17
			(0.76)		(0.78)		(1.08)		(0.88)
Intercept	0.74	0.61	0.41	0.72*	0.49	0.60	0.37	0.40	0.00
	(1.56)	(1.49)	(0.83)	(1.75)	(0.92)	(1.08)	(0.57)	(0.78)	(0.01)
Model	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM
Observations	64	64	50	64	50	64	50	64	50
R-squared	0.14	0.22	0.29	0.23	0.29	0.19	0.27	0.25	0.35

Table 3.9: Determinants of Unsecured Creditors' Recovery Rates

This table reports results from cross-sectional regressions of unsecured creditors' recovery rates. The sample includes 32 defined benefit sponsors from 2006 to 2012 with data on creditor recovery rates from Capital IQ. All variables are defined in Table 3.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the industry level.

Dependent Variable: *Recovery*	(1)	(2)	(3)
DB Liabilities/Adj. Liabilities		0.48**	
		(2.01)	
(DB Liab.-DB Assets)/Adj. Liabilities			1.24
			(1.07)
Equity	-0.78**	-0.70**	-0.69*
	(-2.64)	(-2.42)	(-1.91)
Default barrier	-0.24	-0.18	-0.20
	(-1.70)	(-1.27)	(-1.18)
LTD Issuance	-0.08	-0.04	-0.04
	(-0.65)	(-0.35)	(-0.26)
Asset Tangibility	0.01	0.11	0.01
	(0.07)	(0.53)	(0.07)
Profitability	0.20	0.02	0.06
	(0.29)	(0.03)	(0.09)
Ln(Adj. Assets)	0.08	0.07	0.08
	(1.23)	(1.18)	(1.25)
Ln(Employees)	-0.04	-0.05	-0.05
	(-0.82)	(-0.94)	(-0.94)
Constant	0.10	0.05	0.01
	(0.21)	(0.12)	(0.02)
Model	LPM	LPM	LPM
Observations	32	32	32
R-squared	0.28	0.31	0.30

Table 3.10: Changes in Pension Obligations in Bankruptcy

This table reports results from cross-sectional regressions of the determinants of changes in defined benefit pension obligations. Changes in pension obligations are measured as the difference between pension obligations at bankruptcy emergence and pension obligations prior to filing for bankruptcy, scaled by adjusted assets in the year prior to bankruptcy. The sample includes 62 defined benefit sponsors from 1987 to 2012 with information in the year prior to bankruptcy and in the year after emergence, as well as a subsamples of sponsors with data on plan terminations. All variables are defined in Table 3.1. t-statistics are reported in parentheses and are statistically significant at the 1%(***), 5%(**), and 10%(*) levels. Standard errors are robust and are clustered at the industry level.

Dependent Variable: ΔPBO	(1)	(2)	(3)	(4)	(5)	(6)
DB Liabilities/Adj. Liabilities		-0.10			-0.12	
		(-1.01)			(-0.98)	
(DB Liab.-DB Assets)/Adj. Liabilities			-0.68***			-0.75***
			(-3.30)			(-2.75)
Ln(Adj. Assets)	-0.02	-0.02	-0.01	-0.02	-0.02	-0.01
	(-1.09)	(-1.02)	(-0.90)	(-0.75)	(-0.65)	(-0.50)
Leverage	0.04	0.04	0.04*	0.06	0.06	0.04
	(1.37)	(1.38)	(1.74)	(0.93)	(0.89)	(0.71)
Change in Leverage	0.05	0.05	0.06*	0.07	0.08	0.08
	(1.28)	(1.31)	(1.99)	(0.87)	(0.91)	(1.23)
Employees	0.00	0.00	0.00	0.00	0.00	0.00
	(1.49)	(1.45)	(1.69)	(1.53)	(1.49)	(1.65)
Change in Employees	0.00	0.00	0.00*	0.00	0.00	0.00*
	(1.56)	(1.61)	(1.91)	(1.55)	(1.72)	(1.96)
Terminate				-0.05	-0.05	-0.05
				(-1.01)	(-1.03)	(-1.11)
Intercept	0.13	0.12	0.11	0.12	0.13	0.11
	(1.08)	(1.07)	(1.04)	(0.71)	(0.69)	(0.65)
Model	LPM	LPM	LPM	LPM	LPM	LPM
Observations	62	62	62	39	39	39
R-squared	0.11	0.12	0.19	0.17	0.19	0.25

Chapter 4

Conclusion

In this thesis, I examine the role of defined benefit claimants in Chapter 11 bankruptcy at two time periods: prior to bankruptcy and in Chapter 11 reorganization. In the first essay, I find a negative relationship between corporate defined benefit pension claimants and the likelihood of bankruptcy. In the second essay, I document a role for defined benefit claimants beyond that of traditional creditors in various aspects of the bankruptcy restructuring process.

Both essays in this thesis are motivated by the similarities and differences between defined benefit claimants and other firm lenders. Defined benefit obligations resemble financial liabilities because firms are liable for both types of debt and the promised payouts for either obligation do not depend on the financial performance of the underlying assets. Moreover, pension liabilities require regular contributions akin to interest payments which are tax-deductible and can trigger bankruptcy if missed. At the same time, defined benefit obligations differ from other corporate liabilities because they are reported off the balance sheet, they are guaranteed by the government and they are held by claimants who are less diversified than traditional creditors. These characteristics give pension claimants an incentive to act differently from traditional firm creditors, especially in critical times such as default. This thesis is aimed at understanding the link between defined benefit claimants as firm lenders and Chapter 11 bankruptcy.

Prior to bankruptcy, I document that defined benefit claimants are an important determinant of the firm's decision to file for Chapter 11. Since firms' financial health is one of the key drivers of bankruptcy filings, I control for overall firm indebtedness by accounting for all balance sheet obligations and the two largest off-balance sheet liabilities, defined benefit obligations and operating leases. I proxy

for the role of defined benefit claimants with the ratio of defined benefit obligations to overall liabilities. Holding the level of debt constant, I find that defined benefit claimants are negatively related to the likelihood of bankruptcy. This result is economically important. Given the sample average likelihood of bankruptcy of 50%, an increase in defined benefit liabilities relative to other liabilities is associated with a 6% decrease in the probability of bankruptcy. Moreover, the results extend to different samples and are robust to alternative measures of pension obligations and the role of defined benefit claimants.

The first essay's findings are significant as they highlight a need to account for defined benefit claimants in studies of negotiations between the firm and its creditors. Pension claimants are firm lenders with different wealth, diversification, and characteristics from financial lenders and little is known about how defined benefit claimants negotiate with the firm and how they influence bargaining with the firm's other lenders. While there have been important advances in the literature in determining the role of pension claimants in other corporate decisions and firm characteristics, defined benefit claimants' impact on negotiations prior to bankruptcy has remained largely unexplored. The first essay in this thesis attempts to address this question. The sample in this study is designed with identification in mind so the decision to sponsor a defined benefit plan is taken for granted and some of the main bankruptcy determinants are accounted for through matching bankrupt sponsors to similar solvent sponsors. While I find that defined benefit claimants are related to a lower likelihood of bankruptcy, the study remains silent on the private negotiations that ensue between pension claimants and the firm. Thus, further insight could be gained from studying the private negotiations with defined benefit claimants prior to Chapter 11 to better understand the exact mechanisms through which pension claimants impact the firm's decision to file for Chapter 11.

In bankruptcy reorganization, I find that defined benefit claimants play a role beyond that of the firm's other lenders. Therefore, the differences between defined benefit claimants and the firm's traditional creditors are relevant during the restructuring process as well. I provide evidence that defined benefit claimants are associated with a higher likelihood of pension plan terminations in bankruptcy. Such a relationship points to plan terminations as one loss that defined benefit claimants incur in bankruptcy. In expectation of the losses they will have to in-

cur in bankruptcy, defined benefit claimants have high incentives to negotiate with the firm prior to Chapter 11, as argued in the first essay. Furthermore, I find that defined benefit claimants are associated with higher recovery rates for unsecured creditors and a higher probability of firm survival post-reorganization. The fact that defined benefit claimants are less likely to refile for Chapter 11 after emerging from bankruptcy provides further support for the first essay's findings of a negative relationship between pension claimants and the probability of bankruptcy. Thus, the results from the second essay reinforce the first paper's claims. In the second essay, I also identify defined benefit claimants' willingness to accept pension benefit cuts as one potential channel through which pension claimants influence the bankruptcy reorganization process. After controlling for the expected reduction in liabilities for all creditors due to bankruptcy, I show that the relative role of defined benefit claimants explains the majority of the variation in these benefit cuts. This mechanism is only at work for unfunded pension obligations, which suggests that defined benefit claimants give up the most when they stand to lose the most.

Altogether, the second essay highlights a role for defined benefit claimants in Chapter 11 reorganization beyond that of traditional creditors. These findings are relevant because defined benefit claimants are firm creditors who differ from traditional lenders and may act differently from other creditors. Prior research has documented such a role for banks, private equity funds and hedge funds but defined benefit claimants differ from these lenders as well because of the human capital investment in the firm and the lack of diversification unique to pension claimants. As members of a creditors' committee in bankruptcy, defined benefit claimants can vote on the firm's reorganization plan and may thus be important players in Chapter 11. The second essay documents several specific bankruptcy outcomes that defined benefit claimants influence. Furthermore, Benmelech et al. (2012) show that airline managers use the threat of pension plan termination to extract wage concessions in negotiations with labor. The third chapter in this thesis confirms that defined benefit plan termination is a threat that pension claimants face and a loss that they may have to agree to in bankruptcy. However, my sample includes numerous industries and hence indicates that the threat of plan termination is an important consideration for pension claimants across a wide range of industries and that negotiations between pension claimants and the firm in all sectors of the economy influence

the Chapter 11 reorganization process. While my study expands the applicability of Benmelech et al. (2012)'s results, the level of detail that the authors are able to obtain for the airline industry is not available for all industries in this essay's sample.

Overall, the results in this thesis uncover a role for defined benefit claimants as firm lenders both prior to and in bankruptcy. While my essays provide empirical support for the influence of defined benefit claimants in bankruptcy, a theoretical model that captures defined benefit claimants as a unique lender in bankruptcy will benefit our understanding of the bargaining among creditors and the role of defined benefit claimants in negotiations with the firm and other lenders. Moreover, this thesis identifies benefit concessions as one potential channel through which defined benefit claimants influence the bankruptcy restructuring. However, this mechanism only holds for unfunded pension obligations. Given the results for plan terminations and recovery rates in which the total pension obligation matters while the unfunded portion does not, additional channels through which defined benefit claimants influence the restructuring process can be investigated. A comprehensive study of these additional channels represents an interesting direction for further investigation. Last, the second essay documents a role for labor unions in explaining some of the outcomes of Chapter 11 bankruptcy. Even further, the results show that unions provide explanatory power for outcomes which defined benefit claimants do not influence, while pension claimants explain bankruptcy outcomes that unions do not appear to impact. Thus, the interplay between unions and defined benefit claimants and their respective negotiations with the firm provide a fruitful area for future research.

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Appendices

Appendix A. Accounting Standards for Defined Benefit Pension Plans

The way firms account for defined benefit plans on financial statements has changed over the past decades. In this section, I briefly discuss the accounting principles that govern the reporting of defined benefit pension variables on financial statements, set by the Financial Accounting Standards Board (FASB).

Prior to 1987, there were no standardized accounting rules that governed defined benefit pension accounting. As a result, defined benefit pension variables were not comparable across firms or over time, and significant pension-related assets and obligations were not recognized on firms' financial statements.

In December 1985, the FASB issued the Statement of Financial Accounting Standards No. 87 (SFAS 87), effective for fiscal years beginning after December 15, 1986, which largely governed defined benefit pension accounting until 2006. SFAS 87 introduced a standardized method to measure pension costs and required actuarial estimation of pension liabilities and fair value measurement of pension assets. As a result, employers had to report on the balance sheet a liability (accrued pension cost) if the net periodic pension expense exceeded the employer's cash payments into the plan, or an asset (prepaid pension cost) if the net periodic pension expense was lower than the employer's cash payments. The prepaid/accrued pension cost reported on the balance sheet was obtained by netting several off-balance sheet items: the projected benefit obligation, the fair value of plan assets, and deferred items such as actuarial gains/losses, prior service costs and transition obligations, among others. Nonetheless, the reported pension variable under SFAS 87 represented only a portion of the actual pension assets and liabilities. Moreover, employers had to immediately recognize a minimum liability whenever the accu-

mulated benefit obligation exceeded the fair value of plan assets. Finally, firms were reporting defined benefit pension variables separately for underfunded and overfunded plans.

In February 1998, the FASB issued the Statement of Financial Accounting Standards No. 132 (SFAS 132), effective for fiscal years beginning after December 15, 1997, which was amended by the Statement of Financial Accounting Standards No. 132 (Revised) (SFAS 132(R)) in 2003. While SFAS 132 and SFAS 132(R) significantly revised the defined benefit disclosure requirements, neither standard amended the measurement or recognition of these plans. Along with the detailed reconciliations of the pension liability and plan assets and a detailed computation of the pension expense, the disclosure requirements after SFAS 132 and SFAS 132(R) included information about expected future benefit payments, cash contributions, and information on the composition of pension assets and the plan's investment policy and strategy. Following SFAS 132, pension data was consolidated across all of the firm's plans, regardless of their funding status.

In September 2006, the FASB issued the Statement of Financial Accounting Standards No. 158 (SFAS 158), effective for fiscal years ending after December 15, 2006. SFAS 158 requires employers to report either a net liability (when the projected benefit obligation is greater than the fair value of pension assets) or a net asset (when the projected benefit obligation is less than the fair value of pension assets) on the balance sheet. Under SFAS 158, employers no longer report the accrued/prepaid pension cost or a minimum liability but instead record the plan's underfunded or overfunded status on the balance sheet. In addition, firms must recognize the financial effects of certain plan events in other comprehensive income, and they must include previously deferred items, such as prior service cost and net gain, among others, in accumulated other comprehensive income on the balance sheet.

While over the years different pension variables were accounted for on firms' financial statements, the full defined benefit assets and obligations are only reported in the financial statements' footnotes. Defined benefit pension obligations are measured by the projected benefit obligation (PBO), which is the discounted value of expected future payments that have been earned to date. Future payments are forecasted based on assumptions about mortality rates, employee turnover, retirement

dates, and future salary levels. Defined benefit pension assets are measured as the fair value of the pension plan assets. The value of pension assets depends on both the contributions to the pension plan and the market return on plan assets.

Appendix B. Employees' Legal Rights in Bankruptcy

This section examines the treatment of employee interests in bankruptcy proceedings under Chapter 11 of the Bankruptcy Code. First, I discuss several features of firm employees, such as if workers can hold equity stakes in a firm and the relationship between defined benefit pensions and wages. Next, I discuss whether labor can trigger bankruptcy and the role of workers in Chapter 11, such as the priority status of their claims and the mechanisms through which employees can influence the reorganization process. The description of the legal framework in this section has greatly benefited from the thorough description of the bankruptcy law provided by Korobkin (1996).

Can Labor Hold Equity

Employees can hold firm equity through employee stock ownership plans (ESOPs). In 2014, 13.5 million employees in 7,000 companies in the U.S. were covered by an ESOP. In an ESOP, a company sets up a trust fund and either the firm contributes new shares of its own stock or cash to buy existing shares or the trust borrows money to buy shares and the firm contributes cash to the plan to repay the loan. Shares in the trust are allocated to all full-time employees' individual accounts. Allocations are made either on the basis of relative pay or some predefined formula. When employees leave the company, they receive their stock, which the company must buy back from them at its fair market value. ESOPs are used for different purposes, including to buy shares of a departing owner, to borrow at a lower cost, or to make contributions to employee pension plans. For instance, rather than matching employee contributions to a defined contribution pension plan with cash, the firm will match them with stock from an ESOP. An example of an ESOP is the plan created by United Airlines in 1994 when the company realized it could no longer compete in the deregulated U.S. airline industry without substantial wage reductions. After negotiating with its unions, the firm obtained five-year pay cuts from its employees which were enough to secure a $5 billion loan package through which employees acquired 55% ownership of United Airlines.

Defined Benefit Pensions' Impact on Wages

According to the implicit contract theory discussed by Treynor (1977), workers who anticipate a career with a firm will consider the package of wage and pension benefits they expect to collect over their life cycle. In a model of defined benefit liabilities, Ippolito (1985a) assumes that firms do not provide pensions for free and workers sacrifice current wages for future pension promises. In the model, workers forego an amount which is precisely equal to the present value of the expected pension payments. Thus, employees sacrifice a portion of their compensation throughout their career in exchange for a pension at retirement[50]. In a subsequent study, Ippolito (2004) notes that the amounts workers are willing to pay for the pension promise have declined over time due to the higher incidence of defined benefit plan terminations.

Can Labor Trigger Bankruptcy

Firm employees are able to trigger bankruptcy by not accepting concessions in private negotiations with the firm or by seeking the help of the PBGC. Firms often cite failed negotiations with labor as a reason for filing for Chapter 11 reorganization. For example, in its 2012 bankruptcy filing, Hostess Brands indicated its inability to reach an agreement with its labor representatives on wage and benefit cuts as the main reason for bankruptcy. By not accepting reductions in their salaries and in their pensions, employees are able to bring about a bankruptcy filing.

In addition, labor can trigger bankruptcy with the help of the PBGC. If the PBGC determines that continuing a defined benefit plan will be more expensive to the PBGC than terminating it immediately, the PBGC can trigger bankruptcy to terminate the plan. An example of the PBGC forcing a firm in bankruptcy is the case of LTV Corp in 1987. LTV sponsored a defined benefit pension plan which was seriously underfunded. As the size of the firm's unfunded pension obligations grew, the PBGC increased its monitoring efforts. Eventually the company stopped contributing to its defined benefit pension plan and the PBGC forced LTV

[50] In a related paper, Olson (2002) documents that workers receiving more generous health benefits earn lower wages than comparable workers who prefer fewer fringe benefits.

in bankruptcy in 1987 and took over its pension plan.

Priority Status of Employees' Claims in Bankruptcy

Employees' prepetition claims are generally unsecured claims, i.e. they have the same status as most other creditors' claims. Each employee claim is entitled to receive a pro rata share of the firm's assets. Nonetheless, the Bankruptcy Code gives priority treatment to certain types of employee claims, such as parts of direct compensation, damage claims and promised benefits.

At the time of a Chapter 11 filing, employees may have wages or commissions that have been earned but not yet paid. Under section 507(a)(3), these types of claims have priority limited to $4,000 per individual, earned in the 90 days prior to the bankruptcy filing[51]. These claims for direct compensation have "third priority" status and come after administrative expenses. In addition, employees' claims for wages and benefits earned postpetition have administrative expense priority[52].

Moreover, some damage claims which arise from the firm's breaching its obligations under employment contracts may be given priority in bankruptcy. The status of these claims depends on whether the debtor decides to assume or reject the underlying contract[53]. Under the Bankruptcy Code, some of the claims arising from the contractual breach, such as wages and certain benefits, may qualify for priority treatment. Beyond these limited priorities, damage claims arising from the rejection of a prepetition contract typically constitute general unsecured claims[54].

In bankruptcy, workers' prepetition claims for benefits or for unpaid plan contributions may receive priority. According to the Bankruptcy Code, certain welfare benefit claims, such as vacation, severance, and sick pay leave, have third party priority[55]. However, the total claim, including both direct compensation and fringe benefits, is limited to $4,000 for each employee, and must be earned in the 90

[51] All claims for direct compensation that fall outside the language of section 507(a)(3) are general unsecured claims.

[52] 11 U.S.C. §503(b)(1)(A).

[53] If the firm assumes a prepetition contract, it must pay any damages arising from the breach of contract, but if the firm rejects a contract, no damages are owed. 11 U.S.C. §365(a).

[54] *Id.* §502(b)(7).

[55] *Id.* §507(a)(3).

days before the bankruptcy filing. In addition, part of the prepetition contributions required by a benefit plan receive priority treatment. The claim must arise from services rendered to the company within 180 days before the filing of the bankruptcy petition and may not exceed $4,000 for each employee enrolled in a plan[56]. Even further, if the PBGC files a lien prior to the firm's bankruptcy, the PBGC's claim becomes senior and must be paid in full before unsecured creditors can be paid off.

How Employees Influence Chapter 11

In bankruptcy, there are at least three mechanisms that give employees a voice in the reorganization process: direct representation, labor unions and participation in the creditors' committees.

Under the Bankruptcy Code, any "party in interest, including the debtor, the trustee, a creditors' committee, an equity security holders' committee, a creditor, an equity security holder, or any indenture trustee, may raise and may appear and be heard on any issue" in a Chapter 11 case[57]. If an employee is also an equity holder, as a member of an ESOP or a defined contribution plan, or the employee is a creditor, as a beneficiary of an underfunded defined benefit pension plan, the employee would presumably have the right to speak on any issue. Therefore, one way in which employees' interests can be voiced in bankruptcy would be through direct address of the court. However, this is likely the least common channel through which employees may influence the bankruptcy process due to employees' lack of time or money to take an active stance on their own behalf.

Furthermore, Bankruptcy Rule 2018(d) specifically states that "a labor union or employees' association, representative of employees of the debtor, shall have the right to be heard on the economic soundness of a plan affecting the interests of the employees," but "shall not be entitled to appeal any judgment, order, or decree relating to the plan, unless otherwise permitted by law." A union may have the organizational and financial resources to take an active role in the case on behalf of its members. In addition, under section 1114, the Bankruptcy Code specifically

[56] 11 U.S.C. §§507(a)(4)(A), 507(a)(4)(B).
[57] *Id.* §365(a).

provides for the appointment of a committee of retirees[58]. In contrast, nonunion employees often lack organization, and the Bankruptcy Code does not require the appointment of a formal committee to represent their interests. Therefore, another channel through which employees can influence the reorganization process is through their participation in a labor union.

A third channel through which employees' interests can be heard in bankruptcy restructuring is through representation on a creditors' committee. Soon after the start of a Chapter 11 case, the United States trustee must appoint creditors' committees "consist[ing] of the persons, willing to serve, that hold the seven largest claims against the debtor of the kinds represented on such committee." Members of the creditors' committee can consult with the debtor on the case's administration and investigate the financial condition and operation of the reorganizing debtor[59]. The committee may hire attorneys, accountants, and other professionals, whose expenses and fees constitute administrative expenses charged to the estate[60]. If requested, employee creditors should gain a seat on the creditors' committee. Employees' claims differ from other creditors' claims and thus would seem to be one of the "kinds" that the committee must represent[61]. Additionally, courts generally permit a union representative to serve on the creditors' committee. For both union and nonunion workers, membership on the creditors' committee provides an important channel to have their interests considered in the Chapter 11 proceedings.

[58] *Id.* §1114(b)-(d).
[59] 11 U.S.C. §1103(c).
[60] *Id.* §§330(a), 530(b)(2), 1103(a).
[61] *Id.* §1102(b)(1).

Appendix C. Similarities and Differences Between Defined Benefit Obligations and Financial Liabilities

Defined benefit liabilities resemble financial liabilities in numerous ways, including the firm obligation to pay off both liabilities, the comparability between pension contributions and debt interest payments, and the treatment of both types of lenders as creditors in bankruptcy. At the same time, defined benefit pension liabilities differ from traditional firm obligations along several dimensions, including pension liabilities' government insurance, reporting discretion and off-balance sheet treatment, and the flexibility in contributions. I compare and contrast defined benefit liabilities and traditional firm liabilities, such as bank loans or public bonds, in more detail here. The discussion in this section has largely benefited from the work of Shivdasani and Stefanescu (2010).

Defined benefit pension obligations resemble the firm's other liabilities in various respects. For instance, defined benefit pensions create an ongoing liability for the firm which does not disappear if an employee leaves the firm or if the pension plan is terminated. While companies in distress may preserve cash flows by laying off employees and thus saving on salaries and defined contribution payments, the obligation to pay the defined benefit promise remains. Therefore, firms are liable for their defined benefit pension promises in the same way they are liable for other obligations.

Under the Employee Retirement Income Security Act of 1974 (ERISA), firms are required to make regular minimum contributions to their defined benefit pension plans, equal to the normal cost of the plan plus the level of underfunding amortized over thirty years[62]. Like interest payments on debt, the minimum contributions to defined benefit plans are tax deductible[63]. Prior studies have indicated that the tax deductibility of contributions to defined benefit plans as one of the

[62]The normal cost of a defined benefit plan equals the benefits that active participants earn under the plan in a given year. In minimum contribution estimations, underfunding is defined as the difference between the present value of future benefits and the fair value of plan assets.

[63]While there is no cap on the contributions a firm can make to its defined benefit plans, tax rules limit the amount of contributions that is deductible in a given year. All contributions beyond this limit are taxed with higher rates on an incremental basis, thus reducing firms' incentive to contribute to the pension plan.

main reasons why these pension schemes survived over time (Black, 1980; Tepper, 1981; Tepper and Affleck, 1974).

If the Pension Benefit Guarantee Corporation (PBGC), a government entity established under ERISA to protect corporate defined benefit plans, determines that the plan has not met the minimum funding requirements, if the plan cannot pay current benefits when due, if a lump sum payment is made to a owner of the company, or if the loss to the PBGC is expected to increase unreasonably if the plan is not terminated, the PBGC may trigger bankruptcy in order to terminate the pension plan (Shivdasani and Stefanescu, 2010)[64]. An example of the PBGC forcing a firm in bankruptcy is the case of LTV Corp in 1987. LTV sponsored a defined benefit pension plan which was seriously underfunded. As the size of the firm's unfunded pension obligations grew, the PBGC increased its monitoring efforts. Eventually the company stopped contributing to its defined benefit pension plan. As a result, the PBGC forced LTV in bankruptcy in 1987 and took over its pension plan.

Upon a bankruptcy filing, underfunded defined benefit obligations are usually considered unsecured claims and are entitled to receive a pro rata share of the firm's assets (Korobkin, 1996). However, there are some exceptions to the general case. If the PBGC files a lien prior to the firm's bankruptcy, the PBGC's claim becomes senior and must be paid in full before unsecured creditors can be paid off. If the bankruptcy is already in effect, contributions attributable to service during the 180 days prior to the Chapter 11 filing receive priority treatment under section 507(a)(5) of the Bankruptcy Code[65]. Altogether, pension claimants generally become a part of the unsecured creditors' committee in bankruptcy and are never junior to the firm's other debt obligations.

While defined benefit obligation resemble other firm liabilities, pension claims also differ from the firm's other obligations. For example, under ERISA, corporate defined benefit pension liabilities are guaranteed by the PBGC up to a certain level. In 2014, the maximum benefit guaranteed by the PBGC for a 65-year-old retiree is

[64] In addition, if the defined benefit plan assets are insufficient to pay pension benefits currently due, the PBGC must terminate the pension plan.

[65] Even further, some contributions attributed to post-petition services may also receive administrative priority status.

approximately $4,940 per month. Due to these government guarantees, firms may not bear the full costs of undertaking higher risk in their pension plan decisions and investments. Therefore, pension liabilities may encourage firms to take more risk than other of the firm's liabilities (Shivdasani and Stefanescu, 2010). Rauh (2009) documents that firms in financial trouble allocate plan assets to safer securities, such as government debt and cash and Duan et al. (2013) show that defined benefit pension plans reduce their exposures to company stock prior to debt default. These results provide some evidence that the government guarantees may not necessarily encourage higher risk taking by defined benefit sponsors.

Defined benefit liabilities also differ from other firm obligations because firms are allowed some leeway in the valuation assumptions concerning their pension plan assets and liabilities. For instance, firms can choose the discount rate they use to discount the future value of the pension obligations. According to regulations set by the Securities and Exchange Commission, the discount rate for defined benefit liabilities should be based on Moody's Aa interest rate index but firms have discretion as to the actual rate they use. Bergstresser, Desai, and Rauh (2006) show that managers use the flexibility in valuation assumptions to influence reported earnings. Even further, managers are more aggressive whenever changes to pension assumptions have a greater impact on earnings. In that way, firms can avoid covenant violations tied to earnings performance which differentiates pension obligations from other firm liabilities.

Unlike financial liabilities, defined benefit liabilities are largely reported in the footnotes to firms' financial statements. While some pension plans characteristics are reported on the balance sheet, defined benefit assets liabilities are presented only in the footnotes to firms' financial statements. The accounting rules which govern pension plan reporting have changed over time and different pension plan amounts have been reported on financial statements over time, but the total defined benefit asset and liability are only reported in the footnotes[66]. Such off-balance sheet treatment distinguishes pension liabilities from other types of debt. Nevertheless, prior studies have documented that defined benefit liabilities are reflected in firms' market valuation (Franzoni and Marin, 2006), equity beta (Jin et al., 2006)

[66]For a more detailed description of the accounting rules and the variables reported on financial statements over time, see Section 4 in the Appendix.

and debt ratings (Carroll and Niehaus, 1998). Therefore, there is some evidence that the off-balance sheet treatment does not prevent investors from accounting for defined benefit liabilities similarly to other types of debt.

One further disparity between defined benefit obligations and other firm liabilities is managers' ability to time the contributions to the pension plan. In general, firms have to make regular minimum contributions to the plan which are tax deductive, as discussed above. However, firms with underfunded defined benefit pension plans can make additional contributions to their plans beyond the specified minimum. In this way, firms can contribute more to their plans in high marginal tax states to maximize their tax benefits. Firms do not experience the same flexibility with their other obligations.

Last, defined benefit liabilities differ from traditional liabilities in that the claimants of pension promises are firm employees who are not diversified (Ippolito, 1985a,b, 2004). Unlike a bank with a diversified portfolio, defined benefit claimants' wages, employment, and retirement income are vested in their employer. Since their pension wealth is invested in the firm, defined benefit claimants can and may be plausibly expected to diversify this risk away in their own portfolios. While this essay is not focused on pension claimants' investment decisions, previous studies shed some light on how employees invest in their 401(k) accounts. For example, Mitchell and Utkus (2002) estimate that 5.3 million workers, or about one out of eight 401(k) participants, hold more than 60% of their account in own company stock. Moreover, the authors show that about 2.3 million workers hold between 41 and 60% in own company stock, and another 3 million workers hold between 21 and 40% in company stock. Poterba (2003)studies the cost of poor diversification and finds that the high concentration of own stock ownership leads to a substantial reduction in expected utility upon retirement. In light of the evidence that when they can, pension claimants do not diversify their portfolio away from own company stock, it is possible that these claimants may not diversify the risks inherent in defined benefit pension schemes in their own portfolios.

Altogether, defined benefit liabilities resemble financial liabilities and also differ from traditional liabilities along various dimensions. The similarities between pension obligations and traditional debt give pension claimants incentives to act in sync with the firm's other lenders and to influence corporate decisions similarly to

the impact that the rest of the firm lenders have. Yet the differences between pension liabilities and the firm's other obligations may lead defined benefit claimants to influence firm decisions differently from other lenders. Whether defined benefit claimants act similarly to or differently from other firm lenders is a priori unclear.