The Reallocative Employee Costs of Corporate Bankruptcy*

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Abstract

This paper examines how bankruptcy by a firm leads to costs borne by its employees due to reallocation of the workforce. Using worker-firm matched data from the U.S. Census Bureau's LEHD program, we demonstrate that annual wages deteriorate by about 10% upon corporate bankruptcy and remain below pre-bankruptcy wages for (at least) six years. In addition, when a firm files for bankruptcy, its employees are significantly more likely to work fewer hours, leave the firm, leave the industry, and leave the local labor market, relative to employees of solvent firms with similar characteristics. Wage losses are larger for individuals who leave the firm, the industry, and the local labor market, and for those in "thinner" local labor markets. We show that the ex-ante wage premium that firms must pay to compensate for the expected wage loss due to bankruptcy is up to half of the magnitude of the tax benefits of debt. This result suggests that indirect bankruptcy costs due to workforce reallocation are of a magnitude to be a first-order consideration for firms as they make capital structure choices. *JEL Codes*: G32, G33, J21, J31, J61.

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1. Introduction

When a firm experiences a negative shock, its employees may bear costs due to a resulting reallocation of the workforce. An extensive literature documents reallocative costs to workers resulting from labor market adjustments caused by trade shocks, environmental regulation, and plant closures, among others (Jacobson, LaLonde, and Sullivan, 1993; Walker, 2013; Autor et al., 2014; Hummels et al., 2014). In this paper, we are the first, to our knowledge, to examine the realloctive costs to the workforce of corporate bankruptcy. This focus adds to the literature because bankruptcy is substantially driven by a firm's financial (i.e., debt) choice, and therefore we link the firm's debt choice to costs borne by its employees. As we show below, the workforce experiences substantial ex post wage loss, reductions in hours worked and job security (in terms of whether the worker is able to remain employed in her original firm, in the same industry, or even in the same geographic labor market). These workforce costs in turn circle back to the company with higher debt in the form of higher ex ante wages. Tying these forces together, we explore whether companies would ex ante make choices that reflect the worker costs of bankruptcy – we find that these indirect bankruptcy costs borne by employees are of a magnitude to be a first-order consideration as firms make capital structure choices.

We explore these issues by estimating the impact of an employer's bankruptcy filing on workers' wages and movements across firms, industries, and geographic regions. Our analysis relies on worker-firm matched data from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program from 1985 to 2008 combined with a comprehensive database of public firm bankruptcy cases. A key feature of the LEHD data is that we can follow individual workers across employers over time and observe their wages and other characteristics of employment, such as industry and geographical location. As a result, we can observe worker outcomes independent of post-bankruptcy employers, which is crucial in estimating the effect of bankruptcy on workers.

We construct a sample of 190 bankruptcy filings by U.S. public firms from 1992 to 2005 and follow for up to six years approximately 453,000 workers who were employed by the bankrupt firms. We estimate the effect of bankruptcy filing on worker outcomes by identifying a plausible counterfactual. In particular, we select a group of control firms matched using key observable firm characteristics, and use their employees as a counterfactual group for the employees of the bankrupt firms. Previous research has studied the effects of job displacement on individual outcomes by using non-event workers as a control group (e.g., Jacobson et al., 1993; Sullivan and von Wachter, 2009). We improve upon this approach by explicitly controlling for observable factors that affect post-bankruptcy outcomes, particularly the firm's economic performance, using propensity-score matching.[1] Observable characteristics of the matched firms and their employees, including wage trends before bankruptcy, are statistically equivalent to those of the bankrupt firms and their employees.

We find that wages begin to deteriorate in the year of bankruptcy, relative to the wages of the control group. By two years after bankruptcy, annual wages are about 14% lower than an average worker's annual pre-bankruptcy wages. The present value of wage losses from the year of bankruptcy to six years afterward is 63% of pre-bankruptcy annual wages. The wage loss is driven by a combination of reduced hours worked and reduced hourly wages. Furthermore, compared to employees of the control firms, the employees of the bankrupt firms are 10% to 17% more likely to leave the firm, the industry, and the local labor market to which they were previously attached. Earnings losses are larger for workers who leave the firm, the industry, and

[1] Couch and Placzek (2010) also construct a matched control group of workers using observable characteristics of workers, but not firms, to examine wage patterns of displaced workers in mass layoffs.

the local labor market, consistent with sectoral and geographical transitions being important aspects of workers' labor market adjustments to corporate bankruptcy.

As we show in Appendix Table 2, market leverage is an economically and statistically significant explanation of the probability of filing bankruptcy for our sample firms (also consistent with Lennox (1999) and Shumway (2001)). Hence, the firm's choice of financial leverage affects the costs borne by its employees (through bankruptcy), an indirect cost of bankruptcy that in turn discourages the firm from using debt (Titman, 1984; Berk, Stanton, and Zechner, 2010). Previous research that does not account for this particular indirect cost of bankruptcy shows that the expected (direct and other indirect) costs of financial distress appear to be much smaller than large tax benefits of corporate debt (referred to as the "debt conservatism puzzle" by Graham (2000)). We partially resolve this puzzle by estimating the cost of compensating wage differentials – additional compensation paid by the firm for increasing the risk of wage loss in bankruptcy (Abowd and Ashenfelter, 1981; Topel 1984; Agrawal and Matsa, 2013).

We find that employees in highly levered firms are indeed paid higher wages, controlling for firm and worker characteristics and time-varying industry conditions at the local market level. We document that, relative to the risk-free firm, the expected present value cost of additional compensation for bankruptcy-driven wage risk is about 1.37% to 2.36% of firm value for the typical BBB-rated firm. This additional distress cost is substantial, amounting to between one-fourth to one-half of the tax benefits of corporate debt estimated in previous research (e.g., Graham, 2000; Almeida and Philippon, 2007). In general, across firms with different levels of credit ratings and leverage, the wage premium is up to half of the tax benefits of debt. Therefore, our results suggest that taking into account bankruptcy effects on employees helps to resolve the "debt conservatism puzzle" (Graham, 2000).

Our findings contribute to three strands of literature. First, our paper contributes to the large literature in labor economics that examines the long-run effect of shocks and job displacements in particular on worker outcomes (Jacobson et al., 1993; Sullivan and von Wachter, 2009; Walker, 2013; Autor et al., 2014; Hummels et al., 2014). Our paper in contrast focuses on corporate bankruptcy, which is affected by a firm's financing decision in an importantly way, thereby linking reallocative employee costs of bankruptcy to corporate capital structure policy. This implication is unique to this paper, among papers that study the effect of economic shocks that cause reallocative costs. In addition, consistent with the fundamental purpose of bankruptcy protection being to rehabilitate worthy firms, thereby avoiding liquidiation and the resulting job losses (Supreme Court, *NLRB v. Bildisco & Bildisco,* 1984), the majority of Chapter 11 firms continue to operate through restructuring (Bharath, Panchapagesan, and Werner, 2010). As intended, therefore, a significant fraction of employees stay with the firm after a bankruptcy filing. Hence, we shed new light on how workers who stay with the firm and those who transit to another firm post-bankruptcy experience different labor market adjustments in response to the shock. This analysis highlights that the effect of financial distress on employees goes beyond job displacements. We also examine potential explanations for the wage loss following corporate bankruptcy, and find evidence that loss of industry-specific human capital (Neal, 1995) is an important driver of the wage loss. In addition, the "thickness" of local labor markets, which affects worker reallocation (Moretti, 2011), plays a crucial role in determining post-bankruptcy wages.

Second, by estimating a labor-related indirect cost of financial distress, this paper contributes to the corporate capital structure literature. We show that the additional compensation for wage loss risk due to bankruptcy is a substantial fraction of the tax benefit of debt. Moreover, our results are consistent with a key assumption of theoretical and empirical research arguing that the risk of losing human capital due to bankruptcy is a driver of corporate leverage choices. Theoretical models of Titman (1984), Butt-Jaggia and Thakor (1994), and Berk, Stanton, and Zechner (2010) show that employees' concern about potentially suffering wage declines in financial distress should be a consideration for *ex-ante* corporate capital structure choices.[2]

Third, our paper adds to the empirical literature on corporate bankruptcy. Previous research has examined the effects of bankruptcy filings on firm-level outcomes such as accounting performance, asset size, and management turnover (Gilson, 1989; LoPucki and Whitford, 1992; Hotchkiss, 1995).[3] Relatively little is known about the consequences of bankruptcy (or financial distress in general) for employees, other than firm-level employment (Hotchkiss, 1995; Falato and Liang, 2014), which is partly because worker-level panel data became available to researchers only recently. To our knowledge, this paper is the first to use worker-firm matched micro data to examine labor market outcomes for individuals after

[2] See Agrawal and Matsa (2013) and Kim (2015) for evidence that changes in the cost of job loss, driven by state-level unemployment insurance coverage and an expansion of local labor markets, affect corporate capital structure decisions. Our paper differs from these papers primarily by showing that corporate financial distress indeed has significant private costs to employees.

[3] A large literature in financial economics examines costs of financial distress to the firm and other stakeholders (Warner (1977); Altman (1984); Weiss (1990); Opler and Titman (1994); Pulvino (1998); Bris, Welch, and Zhu (2006)). However, evidence on consequences of financial distress for labor income and other worker outcomes, especially using worker-level micro data, is limited.

corporate bankruptcy and financial distress in general.[4] Moreover, given the active debate in law and finance on the efficacy of Chapter 11 as a means to protect employees during corporate reorganization, our results improve our understanding of the merits of Chapter 11.[5]

The rest of the paper proceeds as follows. The next section describes the data, variables, and summary statistics. Empirical results are given in Section 3. Section 4 discusses the implications of the wage loss estimates for the cost of financial distress and corporate capital structure decisions. Section 5 further discusses the economic magnitudes of our results. The last section concludes.

2. Data and Descriptive Statistics

2.1 Data Sources and Sample Selection

2.1.1 Bankruptcy Event Data and LEHD datasets

We begin by identifying corporate bankruptcy cases from the UCLA-LoPucki Bankruptcy Research Database (BRD) (also used by, among others, Eckbo et al., 2012; Goyal and Wang, 2015; Jiang et al., 2012).[6] The BRD contains public companies with more than $100 million of assets (measured in 1980 dollars) that filed bankruptcy cases from October 1, 1979 to present.[7] We exclude financial and utilities firms.

[4] Hotchkiss (1995) shows that firm-level employment drops by 50% after bankruptcy. Eckbo and Thorburn (2003) and Eckbo, Thornburn, and Wang (2012) estimate the CEO's earnings loss due to bankruptcy in Sweden and the U.S., respectively. Benmelech, Bergman, and Enriquez (2012) use firm and pension plan-level wage data to estimate the magnitude of downward wage renegotiation in financial distress of airline firms. However, none of these papers estimates labor market adjustments at the individual worker level.

[5] The 1978 Bankruptcy Reform Act, which formed the basis of the modern bankruptcy code, suggests that preserving jobs is an important goal of Chapter 11 (see Ondersma (2009) and references therein). For example, House of Representative Report, No. 95-595, p. 220 (1977) states "The purpose of a business reorganization case, unlike a liquidation case, is to … provide its employees with jobs … It is more economically efficient to reorganize than to liquidate, because it preserves jobs and assets."

[6] We thank Lynn M. LoPucki at UCLA for sharing this database.

[7] The majority of bankruptcy cases in the database are filed under Chapter 11 of the U.S. Bankruptcy Code, while only a handful of them are under Chapter 7 (liquidation).

We merge these bankruptcy events to worker-firm matched information from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program, and the Compustat and CRSP databases. The LEHD program covers 30 participating U.S. states as of 2015 (see Appendix Table 1) and provides detailed information on worker-firm matches (i.e., employment relationships) such as wages, industries, and geographical locations of employment and worker characteristics such as age, (imputed) education, and gender. We link datasets from the LEHD infrastructure with other Census Bureau establishment-level datasets, and subsequently with Compustat and CRSP using the Business Register Bridge (BRB).[8]

We restrict our sample to workers for whom we have information on age, education, and gender, which serve as control variables in our wage regressions. To avoid complications associated with early retirement and legal ages for employment, we exclude workers who are older than 55 or younger than 20 in the year before a bankruptcy filing. Furthermore, to exclude wage changes that are due to unstable employment relations with the firm (e.g., temporary workers), we focus on workers with at least two years of tenure with the bankrupt firm one year before its bankruptcy filing.[9]

Because wage is a key variable in our analysis, we provide details on wage information in the LEHD. As discussed in Abowd et al. (2005), the LEHD wage data are on a quarterly basis, with historical time series extending back to the early 1990s for many states (see Appendix Table 1). The LEHD wage records are extracted from the state unemployment insurance (UI) records and correspond to the report of an individual's UI-covered earnings. An individual's UI wage

[8] Specifically, among the databases available from the LEHD infrastructure, we use the Individual Characteristics File (ICF) which provides worker-level characteristic variables, the Employment History File (EHF) which contains annual and quarterly earnings, locations (state and county), and industries for each worker-firm pair, and the Unit-to-Worker Imputation File (U2W) which is used for job-location imputation at the SIC (or NAICS) industry and county level. Then we use the Compustat-SSEL Bridge (CSB) in conjunction with the SSEL-Name and Address File (SSEL-NA) to link the LEHD files with Compustat and the BRD.

[9] Robustness tests based on at least six years of tenure requirement give similar results, which are available upon request.

record is retained in the database as long as the worker earns at least one dollar of UI-covered earnings during a given quarter. According to the Bureau of Labor Statistics, UI coverage is broad and comparable across states. For example, UI covered 96% of total jobs and the covered workers received 92.5% of the wage component of aggregate income in 1994. The UI wages include gross wages and salaries, bonuses, stock options, tips and other gratuities, and the value of meals and lodging, where supplied. In some states, employer contributions to certain deferred compensation plans, such as 401(k), are included in total wages.[10]

2.1.2 Census Establishment-level Data

In addition to the LEHD datasets, we use the Longitudinal Business Database (LBD) to collect additional information on total wages and the number of employees aggregated at the firm level. The LBD tracks more than five million establishments every year, essentially covering the entire U.S. economy. The variables available in the database include the number of employees, annual payroll, industry classifications, and parent firm identifiers. The LBD is useful to obtain comprehensive data on employment and wages at bankruptcy firms, covering all U.S. states, whereas the LEHD program covers 30 states. However, the LBD does not contain data on individual-level wages, industries, and locations of employment, which are in the LEHD.

Lastly, we merge the bankruptcy cases with plant observations from the Census of Manufacturers (CMF) and the Annual Survey of Manufacturers (ASM) maintained by the Census Bureau. The CMF covers all manufacturing plants in the U.S. with at least one employee for years ending '2' or '7' (the "Census years"), including approximately 300,000 plants in each census. The ASM covers about 50,000 plants for the non-Census years. Plants with more than

[10] See www.bls.gov/opub/hom/homch5_b.htm at the Bureau of Labor Statistics.

the threshold number of employees[11] are always included in the ASM whereas those with fewer employees are randomly sampled with the probability increasing in size. Both the CMF and ASM provide information on the operation of plants including labor hours, wage bills, and the number of employees among others. These data are useful when we estimate the effect of corporate bankruptcy on average and per-hour wages and work hours for workers who remain with the bankrupt firm.

2.2 Descriptive Statistics

2.2.1 Bankruptcy Event and Firm Characteristics

Table 1 presents descriptive statistics on bankrupt firms and matched control firms. Panel A shows that during the sample period from 1992 to 2005, 190 out of 457 (41.6%) bankruptcy events from the BRD with Compustat information have at least one matched worker from the LEHD. We begin the event sample from 1992 because we require pre-bankruptcy information from the LEHD which begins its coverage in 1985 (for MD). Given that the LEHD covers 30 states and excludes a few large states in earlier periods of the coverage (e.g., TX, NJ), the match rate appears reasonable.

In Panel B of Table 1, we examine whether the sample of bankrupt firms in the LEHD is representative of the full sample of bankrupt firms from the BRD by comparing the characteristics of the two groups. These statistics are based on information from the latest fiscal year before bankruptcy. See Appendix A for definitions of variables. The panel shows that the bankrupt firms in the LEHD are on average larger than the full sample of bankruptcy firms from BRD in terms of sales, assets, and the number of employees.[12] This characterization is sensible

[11] The threshold was 250 employees before 1999; 500 from 1999 to 2003; and 1,000 after 2003.
[12] The Census Bureau does not permit disclosing median values.

given that larger firms are more likely to have employees across the states and thus are able to be matched with the LEHD data. The LEHD-matched bankrupt firms have lower leverage, higher return on assets, and slightly higher market-to-book than the full BRD database. Panel B also shows that the distribution of bankruptcy outcomes are similar between the LEHD matched and full samples. For example, the proportion of bankruptcy events that lead to acquisition, merger, or continuation of the firm represents about 39% of the events, while those leading to liquidation, firm closure, and refiling represents 18-20% in both samples.

[Table 1 about here]

Panel C compares the bankrupt firms in the LEHD with the matched control firms in the LEHD. The control group is matched with the treatment (i.e., bankruptcy) group based on a propensity score approach. The propensity score is computed for firm-year observations in Compustat from 1992 to 2005 with at least one matched worker from the LEHD-EHF using the following variables: log book assets, book and market leverages, return on assets (ROA), market-to-book, log wage per worker (from the LBD), and year and industry fixed effects. Appendix Table 2 shows the probit regression behind the matching. Based on the propensity score, we choose the two matched firms among non-bankrupt firms that have the closest propensity scores to a given bankrupt firm in the sample.[13] These matched firms are used to filter out the potential effect of factors that are common in both the treated firms and counterfactuals, especially economic performance (proxied by ROA and market-to-book). The statistics show that firms in the treatment group and the propensity-score matched group are statistically equivalent in terms of key characteristics.

[13] An alternative approach would pick matched firms among both bankrupt and non-bankrupt firms. While we are currently not able to perform this alternative matching due to the temporary (i.e., until the revision stage of this paper) expiration of our Census project, we plan to examine this issue in the future when access is available (i.e., when we revise the paper).

Panel D shows the dynamics of firm characteristics five to one years before bankruptcy filings. To facilitate comparison of statistics across the years, we focus on a subset of bankrupt firms that have financial variables from Compustat during all of the five years (N = 140). Over the five years, market leverage ratios increase from 0.31 to 0.61, and ROA, a proxy for profitability, declines from 0.14 to 0.04. Notably, even with a downward trend, a positive ROA (mean of 0.04) in the year before bankruptcy filing suggests the need to file for bankruptcy protection is not solely driven by economic distress but that financial distress (e.g., inability to make a debt interest payment) also likely plays a role (Andrade and Kaplan, 1998). The market-to-book ratio also declines from 1.7 to 1.1. These trends indicate that a significant increase in financial leverage and deterioration in profitability and firm value occur before bankruptcy filings.

2.2.2 Employee Characteristics of Bankrupt and Control Firms

Table 2 presents employee characteristics from the LEHD for the bankrupt and control firms measured one year prior to the bankruptcy filing (or matching). Column (7) shows that the worker characteristics are generally well balanced between the bankruptcy and the propensity-score matched control workers, with all of the t-statistics for testing the difference smaller than conventional levels. In addition to this tight matching process (described above), we follow the literature on labor market adjustments to job displacements (e.g., von Wachter, Song, and Manchester, 2009; Couch and Placzek, 2010; Davis and von Wachter, 2011) and construct an alternative, less strict control sample of employees who are i) employed by non-bankrupt firms and ii) not displaced from an employer due to plant closure. To circumvent computational constraints due to a large number of observations,[14] we randomly select 1% of workers in the LEHD universe who satisfy the criteria in this alternative control group. We impose the same requirements for industry (i.e., excluding financial and utilities sectors), tenure, and age on the control group as for the workers in the sample of bankrupt firms. Column (8) in Table 2 shows that while some worker characteristics (age and years of experience) are statistically different between the treatment and the random control group, other characteristics are similar between the two groups. Overall, the characteristics prior to the events suggest that the propensity-score matched group of workers may serve as a better counterfactual to the treatment group.

In addition, Table 2 shows that employees of bankrupt firms are significantly less likely to stay in the firm, industry, and county they were in before bankruptcy, compared to control firm workers. About 75% of the employees leave the bankrupt firm, 60% leave the industry of the bankrupt firm, and 60% leave the county to which they were attached pre-bankruptcy. In contrast, only 60% of the employees in the matched control firms change their firm, 50% industry, or 50% county, all of which are statistically significantly smaller than those of the treatment group. To determine whether worker movements across firms, industries, or regions are costly due to specific human capital (Farber, 1999) or nonemployment during transition to new jobs, in the next sections we study whether employees of bankrupt firms suffer wage loss, both on average and conditional on worker reallocation.

[Table 2 about here]

3. Empirical Results

3.1 Effects of Corporate Bankruptcy on Employee Wages

[14] The full LEHD file contains more than 2.8 billion quarterly earnings records.

We employ a difference-in-difference approach to estimate the earnings changes that would have occurred in the absence of bankruptcy (i.e., counterfactual earnings), controlling for worker and year fixed effects and individual characteristics. Specifically, we estimate the following regression equation:

$$y_{it} = \alpha_i + \gamma_t + x_{it}\beta + \sum_{k=-4}^{6} d[k]_{it}\lambda_k + \sum_{k=-4}^{6} d[k]_{it} \times BR_i\delta_k + \varepsilon_{it}, \qquad (1)$$

where i indicates workers and t indicates years, and y_{it} is worker i's log real wage in year t. α_i and γ_t denote worker and year fixed effects. x_{it} includes the following worker characteristics: years of experience defined as age - (education + 6), years of education × years of experience, and years of experience × gender. We do not include education or gender individually because they are absorbed by the worker fixed effects, and do not include age because it is collinear with work experience and education. $d[k]_{it}$ is a dummy variable equal to one if year t is k years before or after a bankruptcy filing for the firm and zero otherwise ($-4 \le k \le 6$). BR_i is an indicator variable equal to one if worker i was an employee of a bankrupt firm one year prior to bankruptcy and zero if the worker was in the control group. ε_{it} is the error term. The estimates of δ_k capture the change in employee wages of bankrupt firms in each event year relative to the wages of the control group. Factors other than bankruptcy events, such as macroeconomic and industry conditionsand unobserved heterogeneity across workers, may drive changes in wages after bankruptcy. For example, employees of bankrupt firms may have low abilities and thus experience declines in wages. Thus, we use the difference-in-difference approach above with worker and year fixed effects to address concerns of this sort.

[Table 3 about here]

Table 3 reports results for the dynamics of wages around corporate bankruptcy filings from a variety of specifications. The control group is employees of the propensity-score matched firms in Panel A, and the randomly selected employees of non-bankrupt firms in Panel B. The estimates on the interaction terms $d[k]_{it} \times BR_i$ show that relative to the control group, employees of bankrupt firms experience significant declines in wages over the years after bankruptcy filing. In addition, the lower wages persist several years after bankruptcy. Across all specifications, the coefficients on interaction terms $d[k]_{it} \times BR_i$ are significantly negative at conventional levels in most years from t to t+6, suggesting that corporate bankruptcy leads to a significant labor income loss for the employees.

We gauge the economic magnitude of wage loss using the coefficient estimates on the indicator variables from years t to t+6. For example, the coefficient on $d[0] \times BR$ in column (4) of Table 3 Panel A is -0.072, which is the difference between the log wage in year t and the average log wage in benchmark years "t-5 and "t-6." This estimate implies a 6.9% (= 1 - exp(-0.072)) decline in wage in year t relative to the benchmark wage. Similar calculations using the coefficients on the indicator variables from years t to t+6 give an average annual wage loss of around 10% relative to the benchmark wage and to the non-bankrupt firms. The last row in the table shows that the present discounted value (PDV) of wage losses during the seven years computed using a real discount rate of 5%[15] is 62.6% of the pre-bankruptcy annual wage.

Several other patterns emerge from Table 3. First, specifications with different counterfactual groups and layers of fixed effects yield consistently large present value wage loss estimates, ranging from 40 to 118% of pre-event annual wages. Second, controlling for (time-varying) industry or local market fixed effects generally reduces the wage loss estimate (e.g.,

[15] Similarly, Sullivan and von Wachter (2009) and Walker (2013) use 4% as a real discount rate to compute the present value of earnings losses.

columns (1) vs. (4) or (6)), suggesting that employees of bankrupt firms lose wages partly because they move to industries or local labor markets in which wage levels are relatively low. Yet, there is a significant wage reduction post-bankruptcy even after accounting for this mobility pattern. Third, estimates of wage loss are generally larger when randomly selected workers are used as a counterfactual (see Panel B). For example, column (4) of Panels A and B show present value wage losses are 62.6% and 87.3%, respectively. This result suggests that wage loss estimates that use randomly selected workers as a counterfactual are less conservative (in absolute value) due to the lack of controls for observed employer-level characteristics, particularly proxies for economic performance such as ROA and the market-to-book ratio.[16]

Figure 1 visually presents the wage dynamics based on the coefficient estimates in column (4) of Table 3 Panel A, which include worker and two-digit SIC industry × year fixed effects. The figure shows that employee wages of bankrupt firms (relative to control firm wages) remain essentially flat before the bankruptcy event, validating the parallel trend assumption between the bankruptcy and control groups.[17] Wages then begin to decline in the year before bankruptcy filing and further deteriorate from year t and beyond. For each year from years t to t+6, the employees annually lose 7% to 14% of the pre-bankruptcy (t-6 and t-5) wage, relative to the wages of the matched firm employees in the respective year.

[Figure 1 about here]

3.2 Worker Reallocation and Drivers of Wage Loss after Bankruptcy

[16] Our Panel A estimates may be conservative in that we use book and market leverages as matching variables. To the extent that matched firms with high leverage also experience financial distress (though perhaps to a less extent than bankrupt firms), our estimates are likely conservative in magnitude. Matching that does not use leverage ratios may be able to further delineate the effect of financial distress associated with high leverage on wages. While we are currently not able to perform this alternative matching due to the temporary (i.e., until the revision stage of this paper) expiration of our Census project, we plan to examine this issue in the future when access is available (when we revise the paper).

[17] Although the t-1 wage appears to decline slightly (by 1.5%), the estimate is not statistically significant (t=-0.22).

Our main analysis documents a significant decline in wages for employees of bankrupt firms. However, the baseline estimates hide potentially rich heterogeneity in labor market adjustments post-bankruptcy. In this section, we condition our estimation of wage dynamics on whether workers reallocate across firms, industries, and local labor markets post-bankruptcy, and the characteristics of labor markets, workers, and firms. In the process, we shed light on key mechanisms through which those workers suffer earnings loss – namely costs to worker mobility and specific human capital. We consider the results in this section suggestive given that worker selection on observable and unobservable characteristics (e.g., ability) is likely to affect both the variable of interest (e.g., whether switching industry) and post-bankruptcy outcomes. We partly mitigate this concern by including worker fixed effects in the empirical specification.

3.2.1 Worker Movements and Post-bankruptcy Wages

In this section, we examine whether the earnings loss of employees are due to the loss of specific human capital. In particular, if an important part of the wage loss during the labor market adjustment is due to the loss of human capital specific to firms (Becker, 1962) or industries (Topel, 1991; Neal, 1995), then the reallocative costs of bankruptcy would be borne by workers who leave their firms or industries. To tests these issues, we first examine whether the magnitudes of wage losses are different between the employees who stay with the bankrupt firm and those who leave the firm. We employ an indicator variable *Switch*, which is equal to one if a worker switches to a different firm, industry, or county by year t+3 from her t-1 firm, industry, or county. We perform the following regression:

$$\begin{aligned} y_{it} &= \alpha_i + \gamma_t + x_{it}\beta_1 + \sum_{k=-4}^{6} d[k]_{it}\lambda_k + \sum_{k=-4}^{6} d[k]_{it} \times BR_i \times (Switch_i\delta_k + (1-Switch_i)\theta_k) \\ &+ BR_i\beta_2 + BR_i \times Switch\beta_3 + \varepsilon_{it}, \end{aligned} \quad (2)$$

where the coefficients δ_k represent the effect of bankruptcy on the wages of the bankrupt firm employees who leave the firm, industry, or county; and the coefficients θ_k represent the effect on the wages of the bankrupt firm employees who do not leave. Estimates in Table 4, columns (1) and (2) are from one regression, with θ_k corresponding to the estimates presented in column (1) and δ_k to the estimates presented in column (2).

[Table 4 about here]

Comparing the estimates in Table 4, columns (1) and (2) shows that firm-switchers generally fare worse compared to firm-stayers during the years after the bankrupty filing. For example, using the calculation approach in Figure 1 (also in Section 3.1), workers who leave the firm lose on average 17% of their annual wages for each year from t to t+6, while those who stay with the firm lose only 3% per year. The estimates for *d[k]* × *BR* are statistically significantly different at the 1% level between the firm switchers and stayers for $0 \leq k \leq 3$.[18] This result suggests that a significant portion of wage loss due to bankruptcy is due to workers switching firms.

To further explore the sources of the larger wage loss for firms-switchers, the estimates in columns (3)-(7) "unpack" the wage loss of the workers who leave the bankrupt firm, conditional on whether they leave the industry and/or county. If an employee's human capital (e.g., skills) is specific to her original industry, the wage loss would be more pronounced for "industry switchers," all else equal. Columns (3)-(6) are based on the workers who switch firms. The estimates for *d[k]* × *BR*, $k \geq 0$ in column (4) are substantially more negative than those in column (3). Similarly, the estimates for *d[k]* × *BR*, $k \geq 0$ in column (6) are more negative than those in column (5). This finding suggests that among workers who switch firms, those who switch their

[18] In column (1), workers who stay with the bankrupt firm begin to lose wages in year t+4. This finding can be due to i) bankrupt firms cut wage rates or work hours of their employees and ii) some of these workers may ultimately leave the bankrupt firm from year t+4 and on, and thus experience a wage loss during reallocation.

industries experience a larger wage loss compared with those who remain in the same industry (a wage cut of 15-25% versus a slight wage increase of 3-5% per year). However, the estimates in columns (3) and (5) do not differ much, suggesting that for workers who remain in the same industry, switching counties does not affect their wages. These results show that much of the reallocative costs of corporate bankruptcy are borne by workers who leave their industries but not those who stay in their industries while leaving the firm, suggesting the importance of industry-specific human capital to explain the labor market adjustment after bankruptcy (Topel, 1991; Neal, 1995).[19]

Interestingly, the estimates in column (6) are substantially more negative than those in column (5). This suggests that among workers who leave the industry, those who leave the county experience a larger wage loss than those who stay in the county (a wage cut of 25% vs. 15% per year). This difference could be due to a couple of reasons. First, the difference during the transition period (e.g., from years t to t+2) could reflect longer (temporary) unemployment spells for those who reallocate across local labor markets, as well as industries. Second, the difference after the transition (e.g., from year t+3) may be because workers who switch both the industry and county are "worse" (due to selection) compared to those who switch industry but stay within the same local market.

3.2.2 Local Labor Market Size and Post-bankruptcy Wages

The extant literature has argued that large local labor markets reduce search frictions and make it easier for workers to switch jobs (Diamond, 1982; Moretti, 2011), suggesting that the

[19] Kambourov and Manovskii (2009) show that accounting for occupation-specific tenure (based on the Standard Occuaptional Classification), tenure in an industry (based on the SIC) has a limited effect on wages, suggesting that the effect of industry switches on wages we find may be (in part) due to occupation switches (which are likely correlated). Unfortunately, we are unable to empirically examine this issue because the LEHD data do not contain information on the occupation of employment.

impact of bankruptcy on wage loss would depend on the size of local labor markets. Table 5 examines the employees' post-bankruptcy wage patterns depending on local labor market size (or "thickness"). In columns (1) and (2) of Panel A, we measure the size of the local labor market using the number of establishments in the county-industry from the Census Bureau's LBD, and sort industry-county cells at the median of the distribution as "large" vs. "small" (or "thick" vs. "thin") markets. We find that wages decline less in larger labor markets after bankruptcy, presumably because workers from bankrupt firms can more easily find jobs that require their same skill set (Moretti, 2011). In particular, the coefficients on $d[k] \times BR$ are significantly more negative for smaller local markets at the 10% level in k = 2, 4, 5, and 6. In contrast, we do not find evidence that the overall county population matters for wage losses (due to similarity of coefficients in columns (3) and (4)). Combined with the results in Table 4 regarding mobility across industries and counties, these results highlight the importance of employment opportunities at local firms that require similar human capital, as opposed to large population per se, in mitigating adverse effects of labor market adjustments after bankruptcy. This finding that labor market thickness matters for bankruptcy-driven labor reallocation outcomes is new to the literature on worker adjustment to shocks, and complements a finding in Kim (2015) that wage losses of displaced workers are mitigated in larger local labor markets.

[Table 5 about here]

3.2.3 Worker Age, Labor Unions, Firm Size and Post-bankruptcy Wages

We have so far shown evidence that workforce reallocation across industries is an important driver of the wage loss after bankruptcy. This section explores other dimensions of heterogeneity in worker adjustment to bankruptcy using a specification similar to equation (2).

First, old vs. young employees could face different adjustments to the shock because older workers have limited ability to adjust to new firms (e.g., in terms of skills) given their already accumulated human capital. On the other hand, if younger workers are laid off before the older counterparts due to seniority-based layoff rules which are particularly common in unionized workplaces (Abraham and Medoff, 1984), then the junior employees would suffer greater earnings losses after bankruptcy. Table 6, columns (1) to (2) show that older (age higher than the median) workers experience larger wage cuts after bankruptcy. The coefficients on $d[k] \times BR$ are significantly more negative for old workers at the 10% level in k = 2, 4, and 6.This difference is consistent with older workers having limited ability to find alternative jobs or to adapt to new jobs after bankruptcy.

[Table 6 about here]

Next, we examine whether the magnitude of wage losses varies by collective bargaining coverage for bankrupt firms. Labor unions can essentially work as additional costs to moving across firms in that unionized labor earns higher wages than non-unionized counterparts (Blanchflower and Bryson, 2002), and so workers who move from unionized to non-unionized workplaces would expect to suffer the loss of the "union wage premium." To examine this prediction, we proxy for firm-level union worker coverage using industry-level data on union coverage from Hirsch and Macpherson (2003), who collect the information from the Current Population Survey Outgoing Rotation Group Earnings Files. We define a dummy variable "High" which equals one if the worker is employed in an industry with an above-median level of collective bargaining coverage, and zero otherwise. The results in columns (3) and (4) show that wage losses are indeed larger for employees in industries with higher unionization rates. In particular, the coefficients on $d[k] \times BR$ are statistically significantly different at the 5% level between the high vs. low union industries for most of $0 \leq k \leq 6$. This finding is consistent with the argument that reallocation of workers due to bankruptcy is more costly to employees who earn higher wages due to union presence. In addition, even workers who stay with the bankrupt firm in the unionized sector might have weak bargaining power and thus experience a downward adjustment in wages during financial distress (Benmelech, Bergman, and Enriquez, 2012).

Lastly, columns (5) and (6) explore the effect of bankruptcy on wages, conditional on firm size. The estimates suggest that workers in smaller bankrupt firms fare significantly worse than those in larger firms. The coefficients on $d[k] \times BR$ are statistically significantly different at the 10% to 1% level between large vs. small bankrupt firms for all of $1 \leq k \leq 6$. This result could be due to the fact that larger firms offer better opportunities for reallocation of workers within (e.g., to another division due to internal labor markets) or even across firms (Lazear and Oyer, 2004; Tate and Yang, 2015). In other words, "thicker" internal labor markets could facilitate efficient workforce reallocation as thicker external labor markets do across firms (Section 3.2.2).

3.3 Using Plant-level Data to Unpack the Effect of Bankruptcy on Employees

In this section, we attempt to unpack the wage loss effect documented above, particularly for those who stay with the bankrupt firm (and new hires), to determine whether it is caused by reduced hourly wages, fewer hours worked per worker, or both. All of these will be new insights not available from the LEHD wage information examined above. We match bankruptcy cases from the BRD with the manufacturing plant-level observations in the Census Bureau's ASM and CMF databases. We are able to match 50 such events to at least one plant observation from those databases, which represents a reasonable match rate given that the database covers manufacturing industries only. In addition, we can examine whether there is a concomitant reduction in employee benefits.

We use a specification similar to equation (2) but with the unit of observation being the plant instead of the individual worker. Table 7 shows estimation results. In column (1), we find that the average wages per worker were statistically equivalent between ultimately bankrupt firms and non-bankrupt matched firms four years before bankruptcy ($d[t\text{-}4] \times BR$ = 0.008; t-stat = 0.23). However, the per-worker wages begin to decrease by 6.3% (= -5.5% - 0.08%) in the year before bankruptcy, and by 7.2% and 8.0% in one and two years after bankruptcy relative to the average wage in four years before bankruptcy. The relative cut in wages from years t-4 to t (8.0%) is statistically significant at the 5% level. This pattern of wage reductions is consistent with the earlier finding based on the LEHD data that employee wages deteriorate beginning in year t-1.[20] It is also consistent with theories of labor contracts under potential bankruptcy which predict that compensation optimally decreases during bankruptcy to keep the firm solvent (Berk, Stanton, and Zechner, 2010; Ai and Li, 2015).

Importantly, this reduction in average wages seems to be driven by combination of drops in per-hour wages (column (2)) and in working hours after bankruptcy (column (3)). Per-hour wages decrease by 6.0% to 7.2% during years t-1 to t+1 which drive bulk of the reduction in average wages, while hours per worker decrease by 4.1% to 7.1% during years t+2 to t+4. Moreover, column (4) shows that "fringe benefits" (e.g., pensions, health care) also decline after bankruptcy illustrating that the employees' income loss due to bankruptcy is likely to go beyond a mere wage reduction. However, given that this analysis relies on a relatively small sample in

[20] The main difference, however, is that the plant-level data capture wages of employees who remain in the firm (and of any new hires) while the LEHD data also capture wage dynamics of individuals who transit to other firms.

the manufacturing sector, we are cautious in extrapolating the results to a larger sample of bankruptcy events examined in the earlier section using the LEHD.

[Table 7 about here]

4. Capital Structure Implications of Wage Loss due to Bankruptcy

Employees exposed to higher risk of earnings loss (due to e.g., unemployment, transition to lower paying jobs) would plausibly demand a wage premium to compensate for the risk (Abowd and Ashenfelter, 1981; Topel, 1984).[21] Such a wage premium represents an indirect cost of bankruptcy from the perspective of the firm, potentially creating a disincentive for the firm to use debt. In this section, we ask two related questions to examine whether workers' wage loss in bankruptcy (and financial distress in general) has implications for corporate capital structure decisions. First, we investigate whether employees of firms with higher financial distress risk are indeed paid higher wages, all else equal, consistent with there being compensating differentials of financial leverage (Section 4.1). Second, we estimate the implied wage premium as a cost of financial distress by using the estimates of wage loss due to bankruptcy (Section 4.2). To the extent that employees anticipate the effects of the firm's financial health on the stability of their jobs and wages, our evidence sheds light on the magnitude of the labor-related indirect cost of distress. This analysis in turn sheds light on the plausibility that worker-reated indirect costs of bankruptcy are large enough to affect corporate decisions.[22]

[21]Agrawal and Matsa (2013) point out that even if workers do not gauge their employment stability by observing direct signals of the firm's financial conditions such as financial leverage and credit ratings, they can rely on indirect signals from coworkers, management, the media, and other aspects of economic conditions. In addition, Brown and Matsa (2015) show that job seekers also accurately perceive firms' financial health, suggesting that employees likely perceive the effect of coreporate financial health on their job security as well.

[22] Our approach using compensating wage differentials directly estimates a cost of financial distress given the wage loss for employees due to bankruptcy, relative to other approaches to estimate labor-related costs of financial distress. For example, highly levered firms may also lose high-quality employees (Baghai, Silva, Thell, and Vig,

4.1 Firm Financial Distress Risk and Wage Premia

In this section, we estimate a standard wage equation augmented by proxies for corporate financial distress risk as follows:

$$Log(\text{wage})_{it} = \alpha_{j\times c\times t} + \beta \text{distress risk}_{i,t} + \gamma' X_{it} + \delta' Z_{it} + \varepsilon_{it}, \quad (3)$$

where $\log(\text{wage})_{it}$ is log annual real wage, $\alpha_{j\times c\times t}$ is industry (indexed by *j*) times county (indexed by *c*) times year (indexed by *t*) fixed effects, distress risk_{it} is a proxy for financial distress risk of the employer such as leverage ratios and Altman's Z-score (Altman, 1968), X_{it} is a set of worker-level control variables including sex, education, work experience, and their interaction terms, Z_{it} is a set of firm-level control variables including log book assets, market-to-book ratio, ROA, and tangibility of assets, and ε_{it} is the residual for worker i in year t. Standard errors are clustered at the firm level. The sample consists of a 10% random sample of all worker-years[23] from 1986 to 2008 that are matched with firm-level information from Compustat. We also condition on firms with S&P credit ratings at least 'B-' to ensure that the firms are not in (or very close to) financial distress. This procedure yields about 6.8 million worker-years employed by public firms.

In Table 8 Panel A, we find that higher leverage ratios, which all else equal imply a greater probability of financial distress for the firm (See Appendix Table 2), are associated with higher employee wages. For example, the 0.225 coefficient on market leverage in column (2) suggests that a 10 percentage point increase in leverage ratio is associated with a 2.25% annual wage premium for employees. Importantly, this result is based on a representative sample of individual wages from the LEHD merged with public firms. Thus, our estimates refine those in

2015) or job candidates (Brown and Matsa, 2015) to competing firms due to poor job stability. While highly plausible, direct estimates of these costs are likely more difficult to obtain.

[23] The 10% random sampling is to reduce computational burden in estimating the wage equation with a large number of fixed effects, and is innocuous for the results.

Chemmanur, Cheng, and Zhang (2013), which are based on the firm-level aggregate wage and compensation data. Also, our results complement those in Brown and Matsa (2015), who show that firms with higher risk of financial distress (proxied by CDS prices) offer higher wages to job applicants.

[Table 8 about here]

In Panel B, we split the full sample into two at the 'A-' credit rating of firms. We find a significantly positive association between financial distress risk and employee wages only in firms with ratings lower than 'A-.' For example, estimates in columns (3) and (4) indicate that a 10 percentage point increase in market leverage is associated with a significant 2.38% wage premium for firms with ratings below 'A-', while the same increase in leverage leads to an insignificant 0.78% wage premium for firms with higher credit ratings. This non-linear relation between proxies for financial distress risk and wages is consistent with a convex effect of leverage on financial distress risk (Almeida and Philippon, 2007) and also explains the relatively weak average effects in Panel A.

Panel C splits the full sample into two at the median of the measure of financial distress risk (i.e., leverage or Z-score). It shows that the positive link between financial distress risk and wages is present only when the firm's leverage ratio is relatively high. Estimates in columns (2) and (4) suggest that a marginal increase in leverage is associated with a significant wage premium for highly levered firms, while the effect is insignificant for firms with relatively low leverage. This result is again consistent with a convex relation between leverage and financial distress risk. Overall, results in this section are consistent with theories predicting that wage premia that compensate potential wage loss due to financial distress grow more pronounced as the marginal effect of leverage on distress probability increases.

4.2 Estimates of Labor-related Indirect Cost of Financial Distress

We now turn the magnitude of wage loss we document in Section 3 into a wage premium so that we can gauge whether it is large enough to plausibly affect corporate decisions. As a preliminary step, in Table 9 we compute the present discounted value of wage losses relative to firm value using wage loss estimates in Table 3 and information on the average bankrupt firm in Table 1. The average worker in the bankrupt firm sample earned $36,269 five years prior to bankruptcy (Table 1, Panel B). Using the estimates for event dummies in Table 3, Panel A, column (4) and a 5% real discount rate, the present value of wage losses over years t to t+6 would be $22,699 (=$36,269 × 62.5%). In addition, an average bankrupt firm in the sample had 11,135 employees five years before bankruptcy. Hence, the aggregated PDV of wage losses for the average firm is $252.75 million (= $22,699 × 11,135). Given that the average market value of assets for sample firms is about $1,176 million in year t-5, the aggregated PDV of wage losses equal 21.5% of firm value on average for firms that ultimately go bankrupt.

[Table 9 about here]

With this estimate of the PDV of wage loss upon bankruptcy in hand, we derive the expected PDV of wage loss using valuation trees and risk-adjusted probabilities of default.[24] The main idea of the approach is that workers take into account probabilities of default and entailing wage loss over the period of time that they expect to work for the firm. Appendix B provides the details of the approach. Motivated by the notion of compensating differentials, we argue that in a competitive labor market an employee would demand the same risk-adjusted present value of expected wages (or the same level of expected utiliy) from all firms. Therefore, they would

[24] Almeida and Philippon (2007) use similar valuation trees and risk-adjusted default probabilities to compute the expected costs of financial distress (but their analysis does not address reallocative worker costs or the wage premia that we compute).

demand higher wages from a firm with higher probability of bankruptcy because, all else equal, they anticipate higher personal costs of bankruptcy (i.e., wage losses). This argument implies that the present value wage premium should equal the expected present value of the wage loss due to bankruptcy.

To compute the expected present value of the wage loss due to *bankruptcy* using the risk-neutral probability of *default*, we require an estimate of the conditional probability of bankruptcy given default ("Pr (Bankruptcy | Default)"). Using Moody's Default and Recovery Database (DRD) from 1981 to 2013, we find that 66.4% of public default firms ultimately file for bankruptcy. Similarly, the Altman-Kuehne/NYU Salomon Center Bond Master Default Database shows that from 1981 to 2014, 58.7% of firms in default ended up filing bankruptcy protections.[25] Thus, we use 60% as an estimate for Pr (Bankruptcy | Default) and compute the risk-adjusted probability of bankruptcy as the risk-adjusted probability of default times Pr (Bankruptcy | Default).[26] In Table 10, Panel A we compute the annual risk-neutral probabilities of bankruptcy based on a five-year ($q_{5,1}$) or ten-year cumulative probability of default ($q_{10,1}$) for each credit rating group. In particular, we compute $q_{5,1} = 1-(1-0.6\times p_5)^{1/5}$ and $q_{10,1} = 1-(1-0.6\times p_{10})^{1/10}$, where 0.6 is the estimated probability of bankruptcy conditional on default as discussed above, and p_5 (p_{10}) is the five-year (ten-year) cumulative risk-adjusted default probability from Almeida and Philippon (2007).

[Table 10 about here]

We estimate the wage premium by credit rating and by expected employee tenure. A recent report by the Bureau of Labor Statistics shows that the median number of years that

[25] We thank Edward Altman for sharing his dataset of default events.

[26] Note that our estimation of wage premia ignores potential wage loss outside bankruptcy. This is likely to lead to under-estimation of the wage premium given that our estimates are relative to matched non-bankrupt firms, some of which may be experiencing some level of financial distress and may have reduced wages somewhat (see e.g., Benmelech, Bergman, and Enriquez (2012)).

workers have been with their current employer is 4.6 as of January 2014.[27] Note, however, that the expected tenure of workers is likely longer than the realized average tenure at the current firm, given their future expected employment in the firm. Thus, we use estimates based on a five-year tenure as a baseline, and examine the robustness of our estimation by computing the wage premium assuming expected tenures ranging from one to ten years, as well as an infinite number of years, which gives us the upper bound of the wage premium.

Table 10, Panel B presents the wage premium and tax benefits of debt as a percentage of the market value of firms for each credit rating group from 'AAA' to 'B.' The leverage ratio by credit rating in column (1) is from Molina's (2005) Table VI, and the estimates of net (of personal taxes) tax benefits of debt in column (2) are from Almeida and Philippon's (2007) Table VI, Panel A. Columns (3) to (6) show our calculation of wage premia for one, five, ten and infinite years of expected tenure. We find that the wage premia are generally large enough to offset a significant fraction of tax benefits, with the magnitude depending on credit rating. For an average AA-rated (BBB-rated) firm, tax benefits of debt equal to 2.51% (5.18%) of firm value, while wage premiua given five years of expected tenure are 0.20% (1.37%) of firm value.[28] Therefore, wage premia offset 8% (26%) tax benefits of debt for AA (BBB) rated firms under the assumption of five years of expected tenure. The fraction is higher for lower-rated firms. For BB and B rated firms, wage premia offset 35% and 47% of tax benefits. Overall, our results in this section indicate that the present value of wage premium for financial distress risk is of a magnitude large enough to be an important component of financial distress costs, especially for firms with low credit ratings or high leverage Therefore the wage premium is large enough to be a consideration in corporate capital structure decisions.

[27] See http://www.bls.gov/news.release/pdf/tenure.pdf.
[28] In terms of compensating wage differentials as a percentage of annual wages, an average AA-rated (BBB-rated) firm would pay workers with five years of expected tenure 0.19% (3.98%) of annual wages as wage premiums.

5. Discussions of the Magnitude of Wage Losses Given Bankruptcy

In this section, we discuss various issues related to sample selection and estimation approaches that may affect our estimates of wage loss given bankruptcy or our interpretation of magnitudes. First, firms that file for bankruptcy are likely to experience more severe financial distress than firms that restructure financial claims outside the formal bankruptcy court (e.g., private workout). Hence, our estimates for employee wage losses conditional on bankruptcy are likely larger than for firms that experience less severe distress.

Second, it is generally difficult to distinguish whether a bankruptcy filing is driven by pure financial distress,[29] pure economic distress, or both. As such, employees of bankrupt firms likely lose wages due to the combination of their employers being economically (e.g., low demand for products) as well as financially distressed. Of course, the average firm in our sample has a leverage ratio as high as 61% one year prior to bankruptcy (see Table 1), suggesting that the firms are likely to suffer some degree of financial distress. At the same time, the average ROA (EBITDA/assets) is 4%, which is lower than the average ROA for Compustat firms (about 10%). These characteristics indicate that bankrupt firms in our sample may experience both financial and operational distress to some extent.[30]

Related, wage loss estimates in Panels A and B of Table 3 which use employees of matched firms and randomly selected workers as counterfactuals, respectively, provide some insight into the effect of economic distress on worker wages post-bankruptcy. In particular, given that Panel A controls for the profitability (proxied by ROA) and market valuation (market-to-

[29] For example, pure financial distress could involve firms whose underlying operations remain sound but experience deterioration in performance due to high debt burden or restructuring of debts.

[30] While we are currently not able to isolate the effects of financial distress from economic distress due to the temporary (i.e., until the revision stage of this paper) expiration of our Census project, we plan to examine this issue in the future when access is available (when we revise the paper).

book) by matching on observables, the estimate is less likely to be affected by economic distress of the firm. The finding that the present value of wage loss is about 63% of pre-bankruptcy annual wages using the matched sample vs. 87% using the random sample as a control group indicate that controlling for economic performance of the firm indeed refines (i.e., reduces) the magnitude for wage loss estimates.

Third, it is possible that firms that file for bankruptcy ex post are those that have low ex-ante costs of financial distress. That is, these firms may have chosen highly levered capital structure exactly because they expect lower costs of financial distress. To the extent that firms "self-select" to high leverage (and eventually bankruptcy) in this manner, our estimates of wage losses may understate the costs of financial distress for the universe of firms (see Glover (2015) for a similar argument).

Finally, our estimates ignore some obvious private costs and "benefits" of bankruptcy to workers. For one thing, we truncate our PDV of wage losses estimation at year t+6. To the extent that wage losses persist in the long run, our estimates under-estimate the "true" cost of bankruptcy in a present value sense. However, given the decreasing magnitude of wage loss over time (see Figure 1) and discounting, the economic effect of ignoring years beyond year t+6 may be rather small. Our estimates also ignore other non-pecuniary personal costs of bankruptcy to workers, such as psychological and health costs of reduced earnings and reallocation across jobs and geographical areas. However, these additional private costs may be offset to some extent by increased leisure due to reduced work hours after a bankruptcy shock.

6. Conclusion

This paper examines the effect of corporate bankruptcy on costs borne by employees due to reallocation of the workforce. Using worker-firm matched data from the U.S. Census Bureau's LEHD program, we demonstrate that annual wages deteriorate by about 10% upon corporate bankruptcy and remain below pre-bankruptcy wages for (at least) six years. The discounted present value six-year accumulated wage loss averages more than 63% of pre-bankruptcy annual wages. In addition, when a firm files for bankruptcy, its employees are significantly more likely to work fewer hours, leave the firm, leave the industry, and leave the local labor market, relative to employees of solvent firms with similar characteristics. Wage losses are larger for individuals who leave the firm, the industry, and the local labor market, and for those in "thinner" local labor markets. These results highlight the role of industry-specific human capital and costs of moving across geographical areas as important factors behind the earnings loss post-bankruptcy. Given that bankruptcy is driven by a firm's debt choice, we argue that these workforce costs circle back to the company with higher debt in the form of higher ex ante wages. We show that the ex-ante wage premium that firms must pay to compensate for the expected wage loss due to bankruptcy is up to half of the magnitude of the tax benefits of debt. Therefore, a key implication of this paper is that these indirect bankruptcy costs borne by employees are of a magnitude to be a first-order consideration as firms make capital structure choices.

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Appendix A: Definition of Variables

Variable Names	**Variable Definitions**
Firm characteristics	
Sales	Total sales of the company in $millions
Book assets	Total book value of assets in $millions
Market equity	Market capitalization (market price × number of shares outstanding) in $millions
Market assets	Market equity + total debt
Book (Market) leverage	Total debt/(total debt + book (market) equity), where total debt = long term debt + debt in current liabilities
ROA	operating income before depreciation and amortizations / lagged book assets
Market-to-book	Market to book = (total debt + market value of equity)/(total debt + book equity)

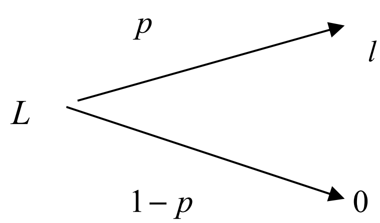
N employee (CS)	Number of employees in a firm, obtained from Compustat
N employee (LBD)	Number of employees in a firm, obtained from Longitudinal Business Database (LBD)
Wage/assets	A firm's total wage (from the LBD) / book assets
Wage per worker	A firm's total wage (from the LBD) / number of employees in the firm (from the LBD)
Z-score	Modified Altman's (1968) Z-score = (1.2working capital + 1.4retained earnings + 3.3EBIT + 0.999sales) / total assets
Ratings	S&P credit ratings from Compustat
Worker characteristics	From LEHD-ICF
Female	An indicator variable equal to one if the worker is female, and zero otherwise
Experience	Years of work experience = age – (years of education + 6)
Education	Years of education (imputed)
Main independent variables	
BR	An indicator variable equal to one for employees in bankrupt firms and zero for employees in control firms
d[j], where j = -4 to +6	Event year indicator variables
Conditional variables	
LeaveFirm / LeaveInd / LeaveCnty	An indicator variable equal to one if her firm / industry / county is different by year t+3 from her t-1 firm / industry / county
Local labor market size	Measured by the number of establishments in each industry (SIC2)-county cell
Local population	Population counts in a given county-year
Union coverage	An indicator variable equal to one if the bankrupt employer is in an above-median union coverage industry. Median union coverage is based on the t-1 union coverage of the industries in which the workers' employers are. We obtain industry-level data on union coverage from Hirsch and Macpherson (2003) who collect the information from the Current Population Survey Outgoing Rotation Group Earnings Files.
Plant-level variables	From ASM and CMF

Log (avg. wage)	Log of average wage per worker
Log (benefits)	Log of average fringe benefits per worker
Working hours per worker	Total labor hours / number of workers

Appendix B: Estimate wage premium due to human costs of bankruptcy

Because employees experience wage reductions or lose wages when a firm goes into bankruptcy, these employees will demand higher wages ex ante to compensate for such a potential loss. To estimate such wage premiums resulting from bankruptcy, we denote L as the NPV of an employee's expected wage loss, and W as the NPV of the wage that a firm pays when it is not in bankruptcy. $W - L$ is thus the NPV of the expected wage that a firm actually offers to its employees. We first derive the wage premium under a two period model, and then we extend the model to the multi-period case.

B.1 A two period (one year) model



l is employee's wage loss when a firm defaults; p is the historical probability of default.

Therefore,

$$L = \frac{pl}{(1 + r_D)}$$

where r_D is the appropriate discount rate. Employees are risk averse and bankruptcies are more likely to happen in bad times. Hence, $r_D < r_f$, the risk free rate. Because we don't know what is the appropriate discount rate r_D, to estimate L, we adopt a risk neutral approach proposed in Almeida and Philippon (2007). Specifically,

$$L = \frac{ql}{(1 + r_f)}$$

where q is the risk-adjusted probability of bankruptcy, and r_f is risk free rate.

Suppose a firm with a default probability q_1 is offering a competitive market wage to its employees, and the NPV of the wage when the firm is not in default is equal to W_1. If the firm's risk-adjusted bankruptcy probability increases from q_1 to q_2, to attract employees in the competitive labor market, the firm has to offer the same level of expected wage NPV to employees. This implies that

$$W_2 - L_2 = W_1 - L_1$$

$$\Rightarrow$$

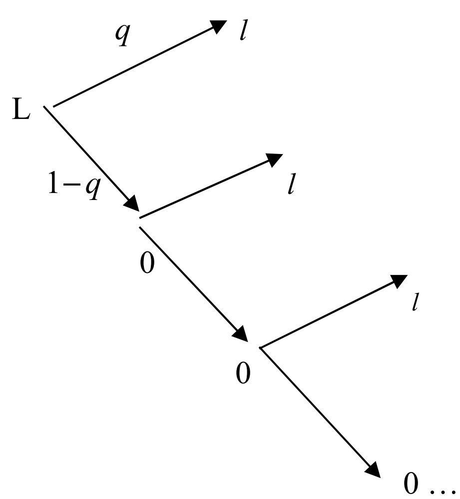
$$\text{Wage premium}=W_2 - W_1 = \frac{q_2 l}{(1+r_f)} - \frac{q_1 l}{(1+r_f)} = \frac{(q_2 - q_1)}{(1+r_f)} l$$

If we use a risk-free firm (i.e., q_1=0) as the benchmark, then the wage premium of a firm with default risk q_2 is equal to

$$\text{Wage premium over a risk free firm}=\frac{q_2}{1+r_f} l$$

This result is intuitive: wage premium is equal to the increase in the expected wage loss resulting from an increased default probability.

B.2 An infinite horizon model



Valuation in this infinite horizon model can be treated as a sequence of two period models.

$$L = \frac{ql + (1-q)L}{(1+r_f)} = \frac{ql}{q+r_f}$$

Considering a firm whose default probability increases from q_1 to q_2, to offer the employees the same expected wage, we need that

$$W_1 - L_1 = W_2 - L_2 \Leftrightarrow$$

$$W_2 - W_1 = L_2 - L_1 = \frac{q_2 l}{q_2 + r_f} - \frac{q_1 l}{q_1 + r_f} = \left(\frac{q_2}{q_2 + r_f} - \frac{q_1}{q_1 + r_f} \right) l$$

For example, if a firm's credit rating changes from AAA to BBB, to compensate workers for the increase in the expected wage loss, wage premium is equal to

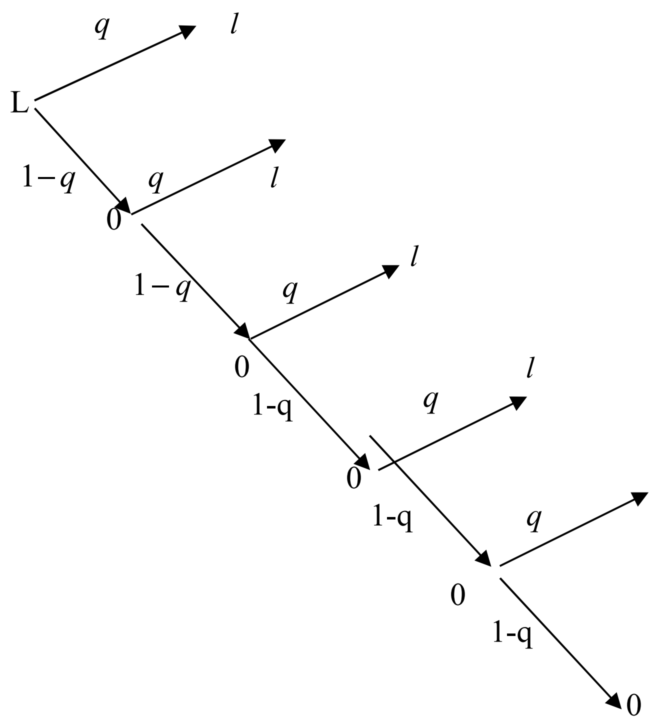
$$W_{BBB} - W_{AAA} = \left(\frac{q_{BBB}}{q_{BBB} + r_f} - \frac{q_{AAA}}{q_{AAA} + r_f}\right) l$$

If we use a risk-free firm, $q = 0$, as the benchmark, the wage premium of a firm with a default probability q is equal to

Wage premium over a risk free firm= $\frac{q}{q + r_f} l$

3. Finite period model

Here we assume that the employees stay with the company for an average of five years until the firm goes bankrupt. The model can be extended to any finite years.



Unconditional risk-adjusted default probability in year n=$(1-q)^{n-1}q$

Then the NPV of the wage loss in year n=$\frac{1}{(1+r_f)^n}(1-q)^{n-1}ql$

The total NPV of wage loss for employees who work for the firm for N years is equal to

$$\sum_{n=1}^{N}\frac{1}{(1+r_f)^n}(1-q)^{n-1}ql$$

Table 1: Descriptive Statistics on Bankruptcy Events and Control Firms

This table provides summary statistics on corporate bankruptcy events from 1992 to 2005 obtained from the UCLA-LoPucki Bankruptcy Research Database (BRD). Panel A shows the procedure to select a sample of bankruptcy events. We exclude firms in the financial and utilities sectors because leverage ratios in these firms are not directly comparable with those of industrial firms. 'BRB' refers to the Business Register Bridge, which is used to link the LEHD data to other Census and non-Census datasets. Panel B compares the summary statistics on the characteristics of bankrupt firms matched to the LEHD data and the full sample of the bankrupt firms in the LoPucki BRD database. 'LBD' refers to the Longitudinal Business Database. Panel C compares the characteristics of the sample of LEHD-matched bankrupt firms with the propensity-score matched control firms. In Panels B and C, the statistics are based on values in the latest fiscal year before bankruptcy or matching (usually year t-1 or t-2, where "year t" is the year of bankruptcy filing or matching). Panel D presents the dynamics of bankrupt firms' mean characteristics from t-5 to t-1. All dollar amounts are CPI-adjusted based on year 2001 constant dollar. Appendix A presents definitions of all variables. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Panel A: Sample Selection Procedure for Bankruptcy Events

Sample Selection Procedure	N Events
Bankruptcy Cases from BRD from 1992 to 2005 excluding financials and utilities	457
Matched with Compustat and BRB	320
Matched with LEHD data	190

Panel B: Characteristics of LEHD-matched Bankrupt Firms Compared to All Bankrupt Firms

Sample	Bankrupt firms in LEHD		All bankrupt firms	
Variable	**Mean**	**STD**	**Mean**	**STD**
Firm characteristics				
Sales ($m)	2,017	7,714	1,557	6,126
Book assets ($m)	1,273	5,280	1,206	4,364
Market assets ($m)	1,531	4,867	1,412	4,245
Market equity ($m)	560	4,496	472	3,548
Book leverage	0.56	0.25	0.66	0.39
Market leverage	0.54	0.23	0.65	0.38
ROA	0.04	0.10	0.02	0.19
Market-to-book	1.18	1.01	1.14	0.86
N employee (Compustat)	10,766	21,487	8,584	19,869
N employee (LBD)	11,088	24,302	8,356	20,701
Wage / Assets	0.44	1.73	0.34	1.44
Wage per worker ($)	38,707	29,138	43,003	33,459
Bankruptcy event outcomes				
	N events	**% of sample**	**N events**	**% of sample**
1.Merged/acquired/continue	75	39.5%	178	38.9%
2.Liquidated/closed/refile Chap. 11	35	18.4%	92	20.1%
3.Unknown	80	42.1%	187	40.9%
Total	190	100%	457	100%

Panel C: Characteristics of Sample Bankrupt Firms Compared to Matched Control Firms

Sample	Bankrupt firms in LEHD		P-score matched LEHD control firms		*t*-stat for mean difference
Variable	**Mean**	**STD**	**Mean**	**STD**	
Log(book assets)	6.62	0.97	6.85	1.90	-0.46
Book leverage	0.56	0.25	0.55	0.25	0.54
Market leverage	0.54	0.23	0.53	0.22	0.57
ROA	0.04	0.10	0.03	0.12	0.37
Market-to-book	1.18	1.01	1.15	0.71	0.04
Log(wage per worker) ($)	10.39	0.56	10.45	0.54	-0.66
N firms	190	-	380	-	-

Panel D: Evolution of Mean Firm Characteristics of Sample Bankrupt Firms before Bankruptcy

Year	t-5	t-4	t-3	t-2	t-1
Sales ($m)	1,448	1,593	1,772	1,932	2,284
Book assets ($m)	1,176	1,316	1,426	1,450	1,411
Market assets ($m)	1,176	1,366	1,529	1,689	1,745
Market equity ($m)	702	772	817	734	626
Book leverage	0.40	0.42	0.44	0.50	0.61
Market leverage	0.31	0.34	0.38	0.47	0.61
ROA	0.14	0.13	0.12	0.08	0.04
Market-to-book	1.71	2.48	1.60	1.29	1.13
N employee (Compustat)	11,135	11,923	12,745	13,075	12,110
N employee (LBD)	12,506	12,438	13,134	12,819	11,605
Wage / Assets	0.60	0.41	0.36	0.27	0.34
Wage per worker ($)	36,269	42,284	39,667	39,437	39,395
N firms	140	140	140	140	140

Table 2: Summary Statistics on Employees in Bankrupt and Control Firms

This table provides summary statistics of the workers employed by bankrupt and control firms. All the numbers are measured at t-1 (where "year t" is the year of bankruptcy filing or matching). The wage data for individual employees are from the LEHD-EHF (Employment History Files). We require that the sample workers have at least 2 years of tenure and are aged between 20 and 55 at year t-1. The random control group is a 1% random sample of workers from the entire LEHD-EHF data who are not displaced, and satisfies the same requirements for industry, tenure, and age as the workers in the bankruptcy sample. % stay in the firm (industry or county) is the percent of employee who stay in the bankrupt firm (the industry of the bankrupt firm or the county where the bankrupt firm is at) till t+3. % leave the firm (industry or county) is the percent of employees who leave the bankrupt firm (the industry of the bankrupt firm or the county where the bankrupt firm is at) by t+3. Wages are from year t-1and are CPI-adjusted (in 2001 constant dollars). Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Workers in bankrupt firms		**Workers in matched control firms**		**Workers in random control firms**		***t*-stat for (3)-(1)**	***t*-stat for (5)-(1)**
	(1) Mean	(2) STD	(3) Mean	(4) STD	(5) Mean	(6) STD	(7)	(8)
Years of education	13.55	2.34	13.31	2.39	13.44	2.41	-1.33	-0.66
Age	38.50	9.27	37.68	9.70	37.16	9.39	-0.95	-1.80*
Years of experience	18.96	9.11	18.37	9.45	17.72	9.20	-0.81	-2.03**
Annual real wages	36,856	31,096	30,693	28,458	32,493	28,082	-0.97	-0.75
% females	49.53	50.00	51.11	49.99	45.17	49.77	0.30	-1.23
% stay in firm	23.59	42.45	40.39	49.07	39.89	48.97	2.66***	4.28***
% stay in industry	39.11	48.80	48.81	49.99	50.83	49.99	1.87*	5.45***
% stay in county	40.40	49.07	50.31	50.00	52.15	49.95	2.33**	6.77***
% leave firm, stay in industry, stay in county	8.33	27.64	4.46	20.65	6.19	24.09	-1.88*	-1.17
% leave firm, leave industry, stay in county	10.82	31.06	8.66	28.13	8.64	28.10	-1.66*	-2.20**
% leave firm, stay in industry, leave county	7.45	26.25	4.91	21.60	5.48	22.75	-1.97**	-2.37**
% leave firm, leave industry, leave county	49.82	50.00	41.57	49.28	39.80	48.95	-2.10**	-7.20***
N of employees	453,000	-	1,734,000	-	523,000	-	-	-
N of firms	190	-	380	-	-	-	-	-

Table 3: Effect of Corporate Bankruptcy on Wages

This table shows results for the difference-in-difference regression analysis of wage changes for workers employed by bankrupt firms surrounding bankruptcy filings relative to a control group of workers. The control group is employees of the matched firms in Panel A, and a 1% random sample of workers from the LEHD universe in Panel B. The dependent variable is log(wage) in 2001 constant dollars. BR is an indicator variable equal to one for employees in bankrupt firms. The event year indicator variables are d[k], where k = -4 to +6. The regressions use the observations from event year -6 to 6 and the benchmark wage is constructed as the average wage between years -6 and -5. This is to reduce noise from using one year as a benchmark. PDV is the present discounted value of wage losses from year t to t+6 computed using a real discount rate of 5%. In the table, we report PDV as a percent of the pre-bankruptcy annual wage for t-6 and t-5. Definitions of all variables are reported in Appendix A. Heteroskedasticity robust t-statistics adjusted for within firm clustering are in parentheses. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Panel A: Matched Firms' Employees as Control Group

Dep. Var. = Log(wage)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d[-4] × BR	0.024	0.003	0.004	-0.002	0.027	-0.002	-0.010
	(1.11)	(0.17)	(0.19)	(-0.09)	(1.53)	(-0.09)	(-0.56)
d[-3] × BR	0.075	0.028	0.029	0.000	0.052	0.000	-0.010
	(1.16)	(0.58)	(0.60)	(0.01)	(1.05)	(-0.01)	(-0.52)
d[-2] × BR	0.083	0.006	0.007	0.005	0.063	0.004	-0.012
	(1.10)	(0.11)	(0.13)	(0.14)	(0.95)	(0.10)	(-0.38)
d[-1] × BR	0.060	-0.015	-0.014	-0.015	0.063	-0.002	-0.012
	(.75)	(-0.25)	(-0.23)	(-0.33)	(0.83)	(-0.04)	(-0.34)
d[0] × BR	-0.034	-0.075*	-0.074*	-0.072**	-0.049	-0.078***	-0.073***
	(-.59)	(-1.77)	(-1.75)	(-2.57)	(-1.02)	(-3.12)	(-3.64)
d[1] × BR	-0.125**	-0.127**	-0.126**	-0.137***	-0.127***	-0.140***	-0.115***
	(-2.06)	(-2.50)	(-2.47)	(-4.10)	(-2.79)	(-4.96)	(-4.75)
d[2] × BR	-0.159**	-0.133**	-0.132**	-0.154***	-0.141***	-0.132***	-0.096***
	(-2.49)	(-2.40)	(-2.38)	(-3.68)	(-2.92)	(-3.84)	(-3.28)
d[3] × BR	-0.129**	-0.085*	-0.084*	-0.102***	-0.121***	-0.100***	-0.071***
	(-2.35)	(-1.83)	(-1.81)	(-3.04)	(-2.66)	(-3.29)	(-3.01)
d[4] × BR	-0.210***	-0.140**	-0.138**	-0.144***	-0.165***	-0.105***	-0.065***
	(-3.12)	(-2.30)	(-2.27)	(-2.70)	(-3.91)	(-3.57)	(-2.99)
d[5] × BR	-0.167**	-0.086	-0.084	-0.067*	-0.134**	-0.048*	-0.030
	(-2.09)	(-1.27)	(-1.24)	(-1.81)	(-2.39)	(-1.69)	(-1.33)
d[6] × BR	-0.219**	-0.111	-0.109	-0.085	-0.163***	-0.043	-0.018
	(-2.37)	(-1.39)	(-1.37)	(-1.60)	(-2.71)	(-1.64)	(-0.89)
d[-4]	0.075***	0.057***	0.057***	0.062***	0.079***	0.063***	0.054***
	(4.93)	(4.40)	(4.29)	(9.77)	(8.06)	(10.56)	(10.73)
d[-3]	0.184***	0.147***	0.145***	0.154***	0.185***	0.153***	0.133***
	(7.57)	(7.93)	(7.79)	(14.41)	(9.55)	(16.25)	(19.43)
d[-2]	0.324***	0.265***	0.262***	0.266***	0.329***	0.269***	0.229***
	(8.01)	(9.32)	(9.25)	(10.30)	(7.94)	(9.61)	(10.73)
d[-1]	0.267***	0.212***	0.209***	0.202***	0.257***	0.193***	0.151***
	(5.10)	(5.27)	(5.21)	(5.62)	(4.95)	(5.35)	(5.18)
d[0]	0.172***	0.137***	0.134***	0.129***	0.174***	0.125***	0.093***
	(4.45)	(4.33)	(4.22)	(5.58)	(5.14)	(5.60)	(5.65)
d[1]	0.127***	0.103***	0.100***	0.095***	0.128***	0.093***	0.071***
	(3.44)	(3.25)	(3.17)	(4.29)	(4.15)	(4.29)	(3.92)

d[2]	0.109***	0.093***	0.091***	0.086***	0.116***	0.085***	0.065***
	(3.20)	(3.14)	(3.08)	(3.47)	(3.74)	(3.55)	(3.35)
d[3]	0.095***	0.086***	0.084***	0.074***	0.103***	0.073***	0.054***
	(2.93)	(2.95)	(2.91)	(2.73)	(3.28)	(2.93)	(2.65)
d[4]	0.091***	0.085***	0.084***	0.072**	0.098***	0.066**	0.049**
	(2.67)	(2.71)	(2.69)	(2.40)	(3.17)	(2.45)	(2.21)
d[5]	0.061	0.057	0.056	0.043	0.073**	0.039	0.027
	(1.54)	(1.56)	(1.56)	(1.25)	(2.00)	(1.34)	(1.14)
d[6]	0.076**	0.072**	0.072**	0.031	0.081**	0.029	0.018
	(1.97)	(2.02)	(2.03)	(0.98)	(2.41)	(0.99)	(0.76)
Experience	-0.262***	-0.211***	-0.211***	-0.188***	-0.248***	-0.185***	-0.173***
	(-20.56)	(-23.16)	(-22.91)	(-28.28)	(-26.86)	(-29.66)	(-32.28)
Female × Experience	0.007***	0.006***	0.006***	0.001	0.005***	0.001	0.001
	(3.84)	(3.37)	(3.41)	(0.60)	(2.77)	(0.79)	(0.82)
Experience × Education	-0.008***	-0.007***	-0.007***	-0.007***	-0.008***	-0.006***	-0.006***
	(-17.00)	(-18.70)	(-18.67)	(-18.07)	(-17.45)	(-18.66)	(-19.65)
Worker FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y				
SIC2 FE		Y	Y				
County FE			Y				
SIC2 × Year FE				Y		Y	
County × Year FE					Y	Y	
County × SIC2 × Year FE							Y
PDV (Wage loss) % of annual wage	-0.805	-0.619	-0.612	-0.626	-0.715	-0.544	-0.404
N (worker-years)	19,223,000	19,223,000	19,223,000	19,223,000	19,223,000	19,223,000	19,223,000
R-squared	0.6000	0.6303	0.6309	0.6351	0.6152	0.6447	0.6817

Panel B: Randomly Selected Workers as Control Group

Dep. Var. = Log(wage)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d[-4] × BR	-0.039	-0.054**	-0.029**	-0.025	-0.027**	-0.033***	-0.033***
	(-1.30)	(-2.31)	(-2.43)	(-1.10)	(-2.57)	(-4.62)	(-4.62)
d[-3] × BR	0.013	-0.029	-0.021	0.003	-0.024	-0.036**	-0.036**
	(0.19)	(-0.63)	(-1.09)	(0.06)	(-1.22)	(-2.09)	(-2.09)
d[-2] × BR	0.010	-0.070	-0.028	0.022	-0.018	-0.016	-0.016
	(0.13)	(-1.26)	(-0.85)	(0.33)	(-0.52)	(-0.40)	(-0.40)
d[-1] × BR	-0.035	-0.118**	-0.066*	-0.014	-0.052	-0.049	-0.049
	(-0.46)	(-1.99)	(-1.74)	(-0.22)	(-1.28)	(-1.17)	(-1.17)
d[0] × BR	-0.135**	-0.186***	-0.158***	-0.121**	-0.159***	-0.167***	-0.167***
	(-2.16)	(-3.80)	(-5.71)	(-2.45)	(-6.11)	(-7.71)	(-7.71)
d[1] × BR	-0.226***	-0.243***	-0.221***	-0.194***	-0.211***	-0.188***	-0.188***
	(-3.59)	(-4.69)	(-8.89)	(-4.27)	(-9.55)	(-10.44)	(-10.44)
d[2] × BR	-0.246***	-0.235***	-0.233***	-0.189***	-0.196***	-0.167***	-0.167***
	(-3.79)	(-4.37)	(-8.39)	(-4.04)	(-7.65)	(-7.71)	(-7.71)
d[3] × BR	-0.202***	-0.178***	-0.165***	-0.146***	-0.144***	-0.107***	-0.107***
	(-3.20)	(-3.30)	(-5.73)	(-2.94)	(-4.89)	(-4.38)	(-4.38)
d[4] × BR	-0.265***	-0.212***	-0.178***	-0.167***	-0.132***	-0.081***	-0.081***
	(-3.43)	(-3.01)	(-5.18)	(-3.40)	(-4.31)	(-3.03)	(-3.03)
d[5] × BR	-0.223***	-0.165**	-0.108***	-0.136**	-0.079**	-0.035	-0.035
	(-2.61)	(-2.12)	(-3.33)	(-2.24)	(-2.44)	(-1.25)	(-1.25)
d[6] × BR	-0.238**	-0.150	-0.113***	-0.132**	-0.064*	-0.018	-0.018
	(-2.35)	(-1.64)	(-2.77)	(-1.99)	(-1.83)	(-0.58)	(-0.58)
d[-4]	0.123***	0.102***	0.091***	0.115***	0.088***	0.078***	0.078***
	(12.87)	(12.34)	(18.53	(16.46)	(18.68)	(17.13)	(17.13)
d[-3]	0.234***	0.194***	0.177***	0.221***	0.172***	0.155***	0.155***
	(14.20)	(13.58)	(21.61)	(18.98)	(21.96)	(20.28)	(20.28)
d[-2]	0.391***	0.332***	0.308***	0.372***	0.300***	0.271***	0.271***
	(15.88)	(15.41)	(24.93)	(21.31)	(25.10)	(23.40)	(23.40)
d[-1]	0.366***	0.306***	0.279***	0.333***	0.260***	0.231***	0.231***
	(12.18)	(11.62)	(19.63)	(16.36)	(18.96)	(17.36)	(17.36)
d[0]	0.284***	0.234***	0.207***	0.259***	0.196***	0.172***	0.172***
	(8.11)	(7.67)	(13.29)	(11.35)	(13.13)	(11.84)	(11.84)
d[1]	0.238***	0.196***	0.167***	0.213***	0.157***	0.136***	0.136***
	(5.70)	(5.37)	(9.25)	(8.05)	(9.22)	(8.20)	(8.20)
d[2]	0.207***	0.172***	0.140***	0.180***	0.129***	0.108***	0.108***
	(4.32)	(4.11)	(6.90)	(5.96)	(6.77)	(5.82)	(5.82)
d[3]	0.184***	0.159***	0.124***	0.152***	0.110***	0.088***	0.088***
	(3.25)	(3.22)	(5.37)	(4.50)	(5.15)	(4.27)	(4.27)
d[4]	0.165***	0.147***	0.106***	0.130***	0.091***	0.067***	0.067***
	(2.59)	(2.64)	(4.16)	(3.43)	(3.85)	(2.95)	(2.95)
d[5]	0.147**	0.137**	0.090***	0.113***	0.077***	0.052**	0.052**
	(2.10)	(2.22)	(3.24)	(2.69)	(2.96)	(2.09)	(2.09)
d[6]	0.134*	0.132*	0.080***	0.097**	0.065**	0.040	0.040
	(1.71)	(1.92)	(2.62)	(2.12)	(2.32)	(1.48)	(1.48)
Experience	-0.262***	-0.206***	-0.189***	-0.248***	-.183***	-0.173***	-0.173***
	(-24.05)	(-26.86)	(-34.74)	(-28.28)	(-35.86)	(-34.39)	(-34.39)
Female × Experience	0.004*	0.004**	-0.001	0.003*	-0.001	-0.002	-0.002

	(1.75)	(2.04)	(-0.77)	(1.90)	(-0.87)	(-1.64)	(-1.64)
Experience × Education	-0.008***	-0.007***	-.006***	-0.008	-0.006***	-0.006***	-0.006***
	(-33.01)	(-29.90)	(-32.45)	(-38.37)	(-31.67)	(-29.11)	(-29.11)
Worker FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y				
SIC2 FE		Y	Y				
County FE			Y				
SIC2 × Year FE				Y		Y	
County × Year FE					Y	Y	
County × SIC2 × Year FE							Y
PDV (Wage loss) % of annual wage	-118.20%	-108.60%	-94.90%	-87.30%	-81.30%	-64.80%	-64.80%
N (worker-years)	8,320,000	8,320,000	8,320,000	8,320,000	8,320,000	8,320,000	8,320,000
R-squared	0.5863	0.6249	0.6289	0.6035	0.6397	0.6842	0.6842

Table 4: Worker Mobility and Post-bankruptcy Wages

This table presents the regression results conditional on workers' movements across firms, industries, and counties. Columns (1) and (2) are from one regression, and Columns (3)-(7) are from another regression. Columns (3)-(6) are based on the employees who switch firms. The variable "Dummy" in the regressions is defined on the top of the table for each column. The regressions include event year indicators (d[-4], …, d[6]) and employee characteristics (Experience, Female × Experience, Experience × Education). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollars. Definitions of all variables are reported in Appendix A. Heteroskedasticity robust t-statistics adjusted for within firm clustering are in parentheses. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Dep. Var. = Log(wage)	(1) LeaveFirm=0	(2) LeaveFirm=1	(3) LeaveInd=0 LeaveCnty= 0	(4) LeaveInd=1 LeaveCnty=0	(5) LeaveInd=0 LeaveCnty=1	(6) LeaveInd=1 LeaveCnty=1	(7) LeaveFirm=0
d[-4]× BR	-0.043**	-0.032**	0.017	-0.046**	0.012	-0.044***	-0.044**
	(-2.00)	(-2.05)	(0.76)	(-2.52)	(0.58)	(-2.82)	(-2.06)
d[-3]× BR	-0.073**	-0.025	0.004	-0.055***	0.049*	-0.033	-0.072**
	(-2.12)	(-1.06)	(0.13)	(-2.58)	(1.83)	(-1.16)	(-2.18)
d[-2]× BR	-0.089*	-0.022	0.013	-0.055	0.070	-0.035	-0.089*
	(-1.90)	(-0.57)	(0.31)	(-1.43)	(1.62)	(-0.78)	(-1.90)
d[-1]× BR	0.039	-0.085	0.079	-0.104**	0.123**	-0.139**	0.038
	(0.61)	(-1.57)	(1.43)	(-2.12)	(2.42)	(-2.45)	(0.60)
d[0]× BR	0.090	-0.184***	0.063	-0.191***	0.039	-0.265***	0.089
	(1.58)	(-4.90)	(1.54)	(-5.97)	(0.93)	(-6.83)	(1.59)
d[1]× BR	0.129	-0.305***	0.001	-0.250***	-0.03	-0.436***	0.130*
	(1.62)	(-7.08)	(0.02)	(-8.08)	(-0.73)	(-9.02)	(1.66)
d[2]× BR	0.131	-0.339***	-0.073	-0.245***	0.041	-0.535***	0.135
	(1.16)	(-6.76)	(-1.02)	(-6.25)	(0.89)	(-8.55)	(1.21)
d[3]× BR	-0.025	-0.188***	0.035	-0.220***	0.034	-0.289***	-0.021
	(-0.41)	(-5.95)	(0.84)	(-8.10)	(0.96)	(-8.59)	(-0.33)
d[4]× BR	-0.199*	-0.162***	-0.031	-0.162***	0.013	-0.226***	-0.200*
	(-1.69)	(-4.78)	(-0.69)	(-5.77)	(0.29)	(-6.44)	(-1.69)
d[5]× BR	-0.155**	-0.072*	0.08	-0.085***	0.132**	-0.147***	-0.154**
	(-2.41)	(-1.88)	(1.43)	(-2.77)	(1.99)	(-3.85)	(-2.38)
d[6]× BR	-0.269**	-0.058*	.091**	-0.067**	0.118**	-0.120***	-0.270**
	(-1.99)	(-1.71)	(2.01)	(-2.50)	(2.13)	(-3.53)	(-1.99)
Control for d[-4] to d[6]	Y	-	Y	-	-	-	-
Worker-level controls	Y	-	Y	-	-	-	-
BR	0.029	-	0.028	-	-	-	-
	(0.44)	-	(0.44)	-	-	-	-
BR × Dummy	0.084**	-	-0.043	0.084*	-0.062	0.132***	-
	(2.06)	-	(-0.83)	(1.75)	(-1.35)	(2.98)	-
Worker FE	Y	-	Y	-	-	-	-
SIC2 × Year FE	Y	-	Y	-	-	-	-
N (worker-years)	19,223,000	-	19,223,000	-	-	-	-
R-squared	0.6359	-	0.6363	-	-	-	-

Table 5: Local Labor Market Size and Post-bankruptcy Wages

This table presents the regression results by local labor market size (or "thickness") and population. Each conditional variable is used to separate the sample into two groups by the median values. The variable "d (second group)" is equal to one if the conditional variable represents "larger" labor markets or populations. The regressions include event year indicators (d[-4], …, d[6]) and employee characteristics (Experience, Female × Experience, Experience × Education). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollars. Definitions of all variables are reported in Appendix A. Heteroskedasticity robust t-statistics adjusted for within firm clustering are in parentheses. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Dep. Var. = Log(wage)	(1) Small local labor market	(2) Large local labor market	(3) Small local population	(4) Large local population
d[-4] × BR	-0.041**	-0.025	-0.034*	-0.031**
	(-2.05)	(-1.48)	(-1.66)	(-2.12)
d[-3] × BR	-0.048**	-0.022	-0.018	-0.057**
	(-1.96)	(-0.76)	(-0.95)	(-2.15)
d[-2] × BR	-0.037	-0.020	-0.012	-0.059
	(-0.86)	(-0.46)	(-0.30)	(-1.28)
d[-1] × BR	-0.074	-0.006	-0.037	-0.073
	(-1.32)	(-0.11)	(-0.85)	(-1.05)
d[0] × BR	-0.132***	-0.068	-0.101***	-0.117**
	(-3.59)	(-1.63)	(-4.02)	(-2.29)
d[1] × BR	-0.188***	-0.151***	-0.170***	-0.186***
	(-4.15)	(-4.41)	(-5.73)	(-3.67)
d[2] × BR	-0.235***	-0.123***	-0.211***	-0.168***
	(-3.99)	(-3.91)	(-5.04)	(-3.12)
d[3] × BR	-0.165***	-0.095***	-0.143***	-0.137***
	(-3.59)	(-3.05)	(-4.74)	(-2.70)
d[4] × BR	-0.233***	-0.106***	-0.180***	-0.186**
	(-2.95)	(-3.10)	(-5.42)	(-1.96)
d[5] × BR	-0.150***	-0.034	-0.099***	-0.111*
	(-3.05)	(-0.83)	(-3.16)	(-1.81)
d[6] × BR	-0.181**	-0.042	-0.120***	-0.129
	(-2.04)	(-1.24)	(-3.50)	(-1.25)
Control for d[-4] to d[6]	Y	-	Y	-
Worker-level controls	Y	-	Y	-
BR	0.159***	-	0.089***	-
	(3.51)	-	(3.45)	-
d [second group]	0.028*	-	0.014	-
	(1.67)	-	(1.20)	-
BR × d [second group]	-0.103**	-	0.030	-
	(-2.17)	-	(0.94)	-
Worker FE	Y	-	Y	-
SIC2 × Year FE	Y	-	Y	-
N (worker-years)	19,223,000	-	19,223,000	-
R-squared	0.6352	-	0.6352	-

Table 6: Worker Ages, Labor Unions, and Firm Size

This table presents the regression results by worker age, unionization rates, and firm size. Each continuous conditional variable is used to separate the sample into two groups by the median. The variable "d (second group)" is equal to one if the conditional variable represents the second group. The regressions include event year indicators (d[-4], …, d[6]) and employee characteristics (Experience, Female × Experience, Experience × Education). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollars. Definitions of all variables are reported in Appendix A. Heteroskedasticity robust t-statistics adjusted for within firm clustering are in parentheses. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Dep. Var. = Log(wage)	(1) Young workers	(2) Old workers	(3) Low union coverage	(4) High union coverage	(5) Small firm	(6) Large firm
d[-4] × BR	-0.039***	-0.038*	-0.035	-0.020	-0.027*	-0.075***
	(-2.58)	(-1.94)	(-1.42)	(-1.15)	(-1.77)	(-3.22)
d[-3] × BR	-0.047**	-0.031	-0.024	-0.025	-0.064**	-0.013
	(-2.54)	(-1.46)	(-1.07)	(-.80)	(-2.36)	(-0.39)
d[-2] × BR	-0.046	-0.020	0.024	-0.055	-0.058	-0.031
	(-1.12)	(-0.62)	(0.38)	(-1.07)	(-1.24)	(-0.56)
d[-1] × BR	-0.033	-0.076*	0.037	-0.117*	-0.104*	-0.017
	(-0.60)	(-1.69)	(0.57)	(-1.71)	(-1.75)	(-0.29)
d[0] × BR	-0.086**	-0.141***	-0.035	-0.166***	-0.149***	-0.053
	(-2.41)	(-4.38)	(-1.08)	(-3.61)	(-3.73)	(-1.34)
d[1] × BR	-0.150***	-0.209***	-0.104***	-0.225***	-0.222***	-0.085***
	(-4.25)	(-5.41)	(-4.01)	(-4.45)	(-5.66)	(-3.08)
d[2] × BR	-0.142***	-0.240***	-0.117***	-0.238***	-0.248***	-0.080**
	(-4.20)	(-5.02)	(-3.78)	(-3.74)	(-5.59)	(-1.98)
d[3] × BR	-0.105***	-0.176***	-0.034	-0.211***	-0.177***	-0.073***
	(-3.29)	(-4.31)	(-1.46)	(-3.90)	(-4.47)	(-2.63)
d[4] × BR	-0.119***	-0.232***	-0.027	-0.293***	-0.245***	-0.083***
	(-3.17)	(-3.49)	(-1.01)	(-3.19)	(-3.18)	(-2.95)
d[5] × BR	-0.090***	-0.127***	-0.006	-0.180**	-0.120***	-0.073**
	(-2.64)	(-2.80)	(-0.23)	(-2.57)	(-2.66)	(-2.01)
d[6] × BR	-0.050	-0.167**	0.019	-0.225**	-0.173**	-0.05
	(-1.46)	(-2.45)	(0.54)	(-2.37)	(-2.07)	(-1.24)
Control for d[-4] to d[6]	Y	-	Y	-	Y	-
Worker-level controls	Y	-	Y	-	Y	-
BR	0.093**	-	0.039**	-	0.140***	-
	(2.50)	-	(2.12)	-	(3.41)	-
d [second group]	0.227***	-	0.028	-	0.015	-
	(10.69)	-	(1.09)	-	(0.76)	-
BR × d[second group]	0.064*	-	0.120**	-	-.089**	-
	(1.95)	-	(2.28)	-	(-1.99)	-
Worker FE	Y	-	Y	-	Y	-
SIC2 × Year FE	Y	-	Y	-	Y	-
N (worker-years)	19,223,000	-	19,223,000	-	19,223,000	-
R-squared	0.6380	-	0.6353	-	0.6353	-

Table 7: Corporate Bankruptcy and Labor Outcomes from Plant-level Data

This table presents estimates of the effect of corporate bankruptcy on labor outcomes using plant-level data from the Census Bureau's ASM and CMF databases. The specification includes event year indicators (d[-4], …, d[6]). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollars. Definitions of all variables are reported in Appendix A. Heteroskedasticity robust t-statistics adjusted for within firm clustering are in parentheses. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Dep. Var.:	(1) Log(Avg. wage)	(2) Log(Wage per hour)	(3) Log (Hours per worker)	(4) Log(Benefits)
d[-4] × BR	0.008	0.068	-0.056***	-0.056***
	(0.23)	(1.63)	(-2.86)	(-2.86)
d[-3] × BR	0.005	0.056	-0.049**	-0.049**
	(0.18)	(1.59)	(-2.24)	(-2.24)
d[-2] × BR	-0.033	0.011	-0.040**	-0.040**
	(-1.02)	(0.31)	(-2.11)	(-2.11)
d[-1] × BR	-0.055*	0.001	-0.051**	-0.051**
	(-1.84)	(0.03)	(-2.50)	(-2.50)
d[0] × BR	-0.072**	-0.005	-0.065***	-0.065***
	(-2.52)	(-0.14)	(-2.82)	(-2.82)
d[1] × BR	-0.068**	0.007	-0.072***	-0.072***
	(-2.39)	(0.25)	(-3.10)	(-3.10)
d[2] × BR	-0.064**	0.035	-0.097***	-0.097***
	(-2.05)	(0.93)	(-3.74)	(-3.74)
d[3] × BR	-0.088***	0.037	-0.126***	-0.126***
	(-2.61)	(0.89)	(-4.09)	(-4.09)
d[4] × BR	-0.063	0.041	-0.098***	-0.098***
	(-1.40)	(0.87)	(-3.13)	(-3.13)
d[5] × BR	-0.033	0.049	-0.078**	-0.078**
	(-0.71)	(1.03)	(-2.50)	(-2.50)
d[6] × BR	-0.007	0.049	-0.046	-0.046
	(-0.13)	(0.91)	(-1.20)	(-1.20)
Control for d[-4] to d[6]	Y	Y	Y	Y
log (plants per segment)	-0.014***	0.000	-0.014***	-0.007
	(-4.46)	(0.15)	(-7.00)	(-1.52)
log (plants per firm)	0.024***	0.031***	-0.007***	0.074***
	(8.87)	(10.20)	(-5.55)	(18.64)
Plant age (/100)	0.544***	0.461***	0.087***	0.835***
	(35.42)	(28.19)	(8.86)	(42.11)
Industry × year FE	Y	Y	Y	Y
Bankruptcy event FE	Y	Y	Y	Y
N (plant-years)	775,000	775,000	775,000	775,000
R-squared	0.2916	0.2577	0.0515	0.6583

Table 8: Financial Distress Risk and Worker Wages

This table presents the relation between financial distress risk and employee wages. Panel A shows the average effect, Panel B sorts firms by their credit ratings at 'A-', and Panel C shows analysis by the measure of financial distress risk (subsampled by median values). The regressions in Panels B-C include the same worker characteristics as in Panel A. The coefficient estimates for these variables are similar to those in Panel A qualitatively and thus are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollars. Heteroskedasticity robust t-statistics adjusted for within firm clustering are in parentheses. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

Panel A: Average Effect of Financial Distress Risk Proxy on Individual Wages

Dep. Var. = Log (wage)	(1)	(2)	(3)
Book leverage	0.102	-	-
	(1.07)	-	-
Market leverage	-	0.225**	-
	-	(2.05)	-
Altman's Z-score	-	-	-0.034
	-	-	(-1.37)
Log book assets	0.050***	0.052***	0.047***
	(5.17)	(5.27)	(5.02)
Market-to-book	0.023**	0.032***	0.026***
	(2.53)	(2.95)	(2.71)
ROA	0.097	0.140	0.189
	(0.53)	(0.74)	(0.89)
Tangibility	0.170*	0.173*	0.198*
	(1.69)	(1.71)	(1.85)
Female	-0.233***	-0.233***	-0.234***
	(-6.26)	(-6.27)	(-6.27)
Education	0.091***	0.091***	0.091***
	(25.40)	(25.41)	(25.50)
Experience	0.028***	0.028***	0.028***
	(12.67)	(12.68)	(12.69)
Female × Experience	-0.001**	-0.001**	-0.001**
	(-2.05)	(-2.05)	(-2.05)
Female × Education	-0.001	-0.001	-0.001
	(-0.54)	(-0.53)	(-0.52)
Experience × Education	-0.001***	-0.001***	-0.001***
	(-9.11)	(-9.12)	(-9.13)
County × SIC2 × Year FE	Y	Y	Y
N (worker-years)	6,811,000	6,811,000	6,811,000
R-squared	0.3465	0.3466	0.3466

Panel B: High vs. Low Credit Ratings

Dep. Var. = Log (wage)	(1) High ratings	(2) Low ratings	(3) High ratings	(4) Low ratings	(5) High ratings	(6) Low ratings
Book leverage	-0.105	0.163*	-	-	-	-
	(-0.42)	(1.83)	-	-	-	-
Market leverage	-	-	0.078	0.238**	-	-
	-	-	(0.27)	(2.36)	-	-
Altman's Z-score	-	-	-	-	0.047	-0.068***
	-	-	-	-	(1.41)	(-3.02)
Log book assets	0.049***	0.030**	0.047***	0.031**	0.036***	-0.311
	(3.51)	(2.39)	(3.46)	(2.36)	(3.82)	(-0.71)
Market-to-book	0.034***	-0.009	0.043***	-0.002	0.028**	-0.172
	(2.73)	(-0.61)	(2.67)	(-0.13)	(2.10)	(-1.23)
ROA	0.057	0.194	0.009	0.241	-0.311	-0.240***
	(0.15)	(1.11)	(0.02)	(1.37)	(-0.71)	(-6.23)
Tangibility	-0.043	0.235**	-0.030	0.239**	-0.172	0.036***
	(-0.30)	(2.17)	(-0.19)	(2.17)	(-1.23)	(3.08)
Control for worker characteristics	Y	-	Y	-	Y	-
County × SIC2 × Year FE	Y	-	Y	-	Y	-
N (worker-years)	6,811,000	-	6,811,000	-	6,811,000	-
R-squared	0.3471	-	0.3471	-	0.3477	-

Panel C: High vs. Low Level of Proxy for Financial Distress Risk

Dep. Var. = Log (wage)	(1) Low book lev.	(2) High book lev.	(3) Low mkt. lev.	(4) High mkt. lev.	(5) Low Z-score	(6) High Z-score
Book leverage	-0.195	0.213***	-	-	-	-
	(-0.62)	(2.69)	-	-	-	-
Market leverage	-	-	-0.137	0.201**	-	-
	-	-	(-0.21)	(2.16)	-	-
Altman's Z-score	-	-	-	-	-0.016	-0.004
	-	-	-	-	(-0.56)	(-0.10)
Log book assets	0.052***	0.051***	0.049***	0.055***	0.048***	0.275
	(4.22)	(5.01)	(3.93)	(5.22)	(4.64)	(1.56)
Market-to-book	0.037***	-0.007	0.041***	-0.032	0.055***	0.105
	(3.06)	(-0.46)	(2.61)	(-1.22)	(3.93)	(1.10)
ROA	-0.260	0.369**	-0.268	0.524***	0.275	0.000
	(-1.06)	(2.34)	(-1.01)	(3.80)	(1.56)	(0.00)
Tangibility	0.373**	0.078	0.318**	0.092	0.105	0.035**
	(2.54)	(0.81)	(2.08)	(1.04)	(1.10)	(2.45)
Control for worker characteristics	Y	-	Y	-	Y	-
County × SIC2 × Year FE	Y	-	Y	-	Y	-
N (worker-years)	6,811,000	-	6,811,000	-	6,811,000	-
R-squared	0.3468	-	0.3468	-	0.3469	-

Table 9: Estimates of Present Discounted Value of Wage Losses in Bankruptcy

This table presents estimates of the present discounted value (PDV) of wage losses for workers employed by bankrupt firms (relative to market value of the firm's assets). The values in items A, C, and E come from Table 1, Panel D. The value in item B is estimated from the regression coefficients in Table 3, Panel A, Column 4. Specifically, the regression coefficients on the event year indicators in Table 3 represent the change in log(wage) for the event year relative to the benchmark year, i.e., log(wage1)-log(wage0), where wage1 is the wage in the event year and wage0 is the wage in the benchmark year. Taking exponential of these coefficients and then deducting 1, we obtain the percent wage change (wage1-wage0)/wage0. Multiplying these percent wage changes by wage0 (which is item A, $36,269) gives the dollar amount of wage changes (wage1-wage0) for each year. Summing up the present values of these dollar wage changes from years t to t+6 a real discount rate of 5% gives the value for item B (i.e., present value as of year t). All dollar amounts are CPI-adjusted based on year 2001 constant dollars.

Item	Variable	Value
A	Average real wage per worker for bankrupt firms in t-5	$36,269
B	Present value of wage losses per worker from t to t+6, based on regression coefficients in Table 3 Panel A, Column 4	$22,699
C	Average number of employees per firm in t-5	11,135
D = B × C	PV of total wage loss for average firm	$252.75 m
E	Average market value of assets in t-5	$1,176 m
F = D / E	PV of total wage loss / market value of assets (t-5)	21.5%

Table 10: Estimates of Ex-ante Wage Premium

Using the ex-post wage loss numbers in Table 9, this table estimates the ex-ante expected wage loss (i.e., ex-ante wage premium). Panel A converts the multi-year default probability into the one-year bankruptcy probability. The one-year risk-adjusted bankruptcy probability $q_{5,1}$ ($q_{10,1}$) is equal to = $1\text{-}(1\text{-}0.5\times p_5)^{1/5}$ $(1\text{-}(1\text{-}0.5\times p_{10})^{1/10})$, where 0.6 is the estimated probability of bankruptcy conditional on default (based on Moody's Default and Recovery Database and the Altman-Kuehne/NYU Salomon Center Bond Master Default Database), and p_5 (p_{10}) is the five-year (ten-year) risk-adjusted default probability provided in Almeida and Philippon (2007) (AP). In Panel B, we use $q_{5,1}$ for the 1-year and 5-year tenure assumptions (Columns 3 and 4) and $q_{10,1}$ for the 10-year and infinite-year tenure assumptions (Columns 5 and 6). Denote the PV of total wage loss for the average firm (252.75 million, item D from Table 9) as wl, and the average market value of sample firms ($1,176 million in t-5, from Table 9 item E) as A. Assume the risk free rate is 2.5% over our sample period. Then Column 6 = $q_{10,1}/(q_{10,1}+$ risk free rate$)\times$wl/A. Appendix B provides more detailed models and calculations. Tax benefits and wage premiums in the table are the present values of tax benefits and wage premiums as percentages of pre-distress firm value. All numbers in the table are in %.

Panel A: Risk-adjusted Probability of Default (%)

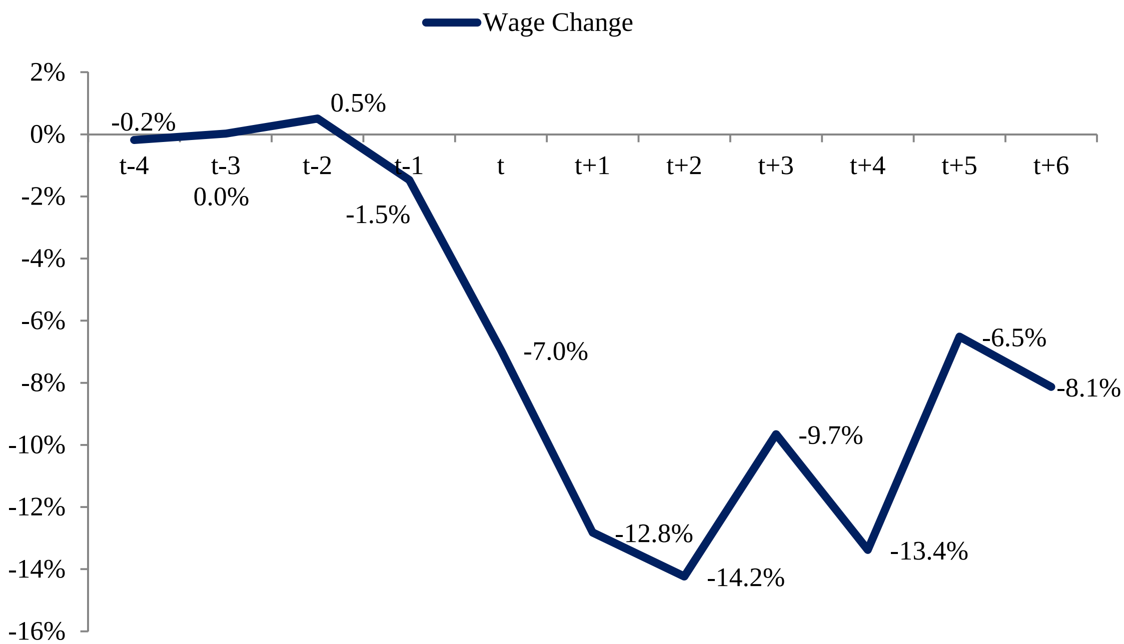
Credit ratings	p_5 = Five-year risk adjusted default probability from Table III in AP	p_{10} = Ten-year risk adjusted default probability from Table III in AP	$q_{5,1}$ = One year risk adjusted bankruptcy probability based on p_5 in (2)	$q_{10,1}$ = One year risk adjusted bankruptcy probability based on p_{10} in (3)
	(1)	(2)	(3)	(4)
AAA	0.54	1.65	0.06	0.10
AA	1.65	6.75	0.20	0.41
A	7.07	12.72	0.86	0.79
BBB	11.39	20.88	1.41	1.33
BB	21.07	39.16	2.67	2.64
B	34.9	62.48	4.59	4.59
BBB minus AA	9.74	14.13	1.21	0.92

Panel B: Tax Benefits of Debt and Wage Premiums by Expected Tenure (%)

Credit ratings	Leverage ratio (from Table VI in Molina)	Tax benefits of debt (from Table VI in AP)	Wage premium (tenure assumption)			
			1 year	5 years	10 years	infinite
	(1)	(2)	(3)	(4)	(5)	(6)
AAA	9	0.47	0.01	0.06	0.19	0.82
AA	17	2.51	0.04	0.20	0.76	3.04
A	22	4.40	0.18	0.85	1.44	5.16
BBB	28	5.18	0.29	1.37	2.36	7.46
BB	34	7.22	0.56	2.53	4.44	11.04
B	42	8.95	0.96	4.19	7.12	13.91
BBB minus AA	11	2.67	0.25	1.17	1.60	4.42

Figure 1: Wage Changes for Workers Employed by Bankrupt Firms

This figure uses regression estimates in Table 3, Panel A, Column 4 and presents the real wage changes (in percent) for employees of bankrupt firms from the average wages for five and six years before bankruptcy, relative to the wage changes for matched firm employees. In the figure, ‘year t’ represents the year of bankruptcy filing.



Appendix Table 1: Coverage of LEHD States and Years

This table shows the coverage of states and years by the U.S. Census Bureau's LEHD program's Employment History File (EHF). See Vilhuber and McKinney (2014) for details of the LEHD infrastructure.

State	State Abbreviation	First Year	Last Year
Arkansas	AR	2002	2008
California	CA	1991	2008
Colorado	CO	1990	2008
Florida	FL	1992	2008
Georgia	GA	1994	2008
Hawaii	HI	1995	2008
Iowa	IA	1998	2008
Idaho	ID	1990	2008
Illinois	IL	1990	2008
Indiana	IN	1990	2008
Louisiana	LA	1990	2008
Maryland	MD	1985	2008
Maine	ME	1996	2008
Montana	MT	1993	2008
North Carolina	NC	1991	2008
North Dakota	ND	1998	2008
Nevada	NV	1998	2008
New Jersey	NJ	1996	2008
New Mexico	NM	1995	2008
Oklahoma	OK	2000	2008
Oregon	OR	1991	2008
Rhode Island	RI	1995	2008
South Carolina	SC	1998	2008
Texas	TX	1995	2008
Utah	UT	1999	2008
Virginia	VA	1998	2008
Vermont	VT	2000	2008
Washington	WA	1990	2008
Wisconsin	WI	1990	2008
West Virginia	WV	1997	2008

Appendix Table 2: Probit Regression for Matching

This table shows the result of the probit regression to find matched firms for the main sample of public bankrupt firms from the BRD. All firm-year observations are from Compustat with at least one worker in the LEHD-EHF data from 1992 to 2005. Robust t-statistics adjusted for sample clustering at the firm level are in parentheses. Definitions of variables used for matching are in Appendix A. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	(1)
Dep. Var.	1(Bankruptcy)
Log book assets	0.192***
	(7.19)
Book leverage	-1.190***
	(-3.08)
Market leverage	4.159***
	(9.07)
ROA	-4.027***
	(-10.80)
Market-to-book	0.065*
	(1.70)
Log average wage	-0.044
	(-0.43)
Year FE	Y
SIC2 FE	Y
N (firm-years)	20,900
Pseudo R-squared	0.35
Chi-square p-value	0.00