The Labor Impact of Corporate Bankruptcy*

John R. Graham

Hyunseob Kim

Si Li

Jiaping Qiu†

August 2015

Abstract

This paper quantifies the human costs of corporate bankruptcy by estimating worker outcomes after a bankruptcy filing by their employers. Using worker-firm matched data from the U.S. Census Bureau's LEHD program, we demonstrate that annual wages deteriorate by about 10% upon bankruptcy and remain below pre-bankruptcy wages for (at least) six years. The present value six-year accumulated wage loss averages more than 63% of pre-bankruptcy annual wages. In addition, when an employer files for bankruptcy, the majority of its employees leave the firm, leave the industry, and leave the local labor market to which they were previously attached. Finally, we show that the ex-ante wage premium to compensate for the ex-post wage loss due to bankruptcy is significant and of the same order of magnitude of the tax benefits of debt, consistent with firms considering the human costs of corporate bankruptcy as they make capital structure choices.

JEL Classification: G3, G32, G33, J24, J31, J33; *Keywords*: Bankruptcy, Costs of financial distress, Human capital, Wage loss; Capital structure

---

* We thank Ashwini Agrawal (AFA discussant), Todd Gormley, Andrew Karolyi, David Matsa, Roni Michaely, Karin Thorburn (Cavalcade discussant), Pab Jotikasthira (CICF discussant), Wei Wang (EFA discussant), Liu Yang (FIRS discussant), Hayong Yun, and seminar and conference participants at AFA, Census Bureau RDC Conference, CICF, Cornell University, EFA, FIRS conference, IDC Summer Finance Conference, SFS Finance Cavalcade, SOLE/EALE meetings, and University of Calgary for helpful feedback. We also thank Bert Grider at the Triangle Census RDC for help with data and clearance requests. Any opinions and conclusions expressed herein are those of the author and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed. This research uses data from the Census Bureau's Longitudinal Employer Household Dynamics Program, which was partially supported by the following National Science Foundation Grants SES-9978093, SES-0339191 and ITR-0427889; National Institute on Aging Grant AG018854; and grants from the Alfred P. Sloan Foundation. We are grateful to Lynn LoPucki of UCLA for sharing his Bankruptcy Research Database. Kim acknowledges generous financial support from the Kwanjeong Educational Foundation. Li and Qiu acknowledge financial support from the Social Sciences and Humanities Research Council of Canada. The initial version of this paper was titled 'Human Capital Loss in Corporate Bankruptcy.'

† John Graham (john.graham@duke.edu), Fuqua School of Business, Duke University, Durham NC 27708, phone: (919) 660-7857, fax: (919) 660-8038; Hyunseob Kim (hk722@cornell.edu), Samuel Curtis Johnson Graduate School of Management, Cornell University, Ithaca, NY 14583, phone: (607) 255-8335; Si Li (sli@wlu.ca), Financial Services Research Centre, School of Business and Economics, Wilfrid Laurier University, Waterloo, Ontario N2L 3C5, Canada, phone: (519) 884-0710 ext. 2395, fax: (519)888-1015; Jiaping Qiu (qiu@mcmaster.ca), DeGroote School of Business, McMaster University, Hamilton, Ontario L8S 4M4, Canada, phone: (905) 525-9140 ext. 23963, fax: (905) 521-8995.

1. Introduction

Corporate financial distress and bankruptcy impose significant costs on firms and their stakeholders. In the corporate bankruptcy literature, quantifying bankruptcy costs is an important empirical issue (e.g., Senbet and Wang, 2012). In particular, indirect costs are argued to be critical, such as the loss of product market shares (Opler and Titman, 1994), inefficient asset sales (Shleifer and Vishny, 1992), and losses resulting from the firm's interaction with non-financial stakeholders including customers, suppliers, and employees (Titman, 1984).[3] These indirect costs, however, are difficult to quantify particularly for a broad sample of firms. A few papers provide empirical evidence on specific indirect costs of financial distress, including the loss of market shares to competitors (Opler and Titman, 1994) and asset fire sales (Pulvino, 1998, 1999; Ramey and Shapiro, 2001). There is, however, little research examining the labor consequences of corporate bankruptcy, although employees are an important group of the firm's stakeholders and human capital plays a critical role in firms and in the overall economy.[4]

This paper fills the void by quantifying the income and employment consequences of corporate bankruptcy for employees.[5] Combining worker-firm matched data from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program with a comprehensive database of Chapter 11 bankruptcy cases, we estimate the impact of employers' bankruptcy filing of on their employees. The key feature of the LEHD data is that we can

[3] In contrast, the literature shows that direct costs of financial distress, such as litigation fees, are relatively small ranging from 1% to 6% of pre-bankruptcy firm value (Warner, 1977; Altman, 1984). In addition, Andrade and Kaplan (1998) use a sample of 31 highly levered transactions and show that the *total* costs of financial distress (which include both direct and indirect costs) range from 10% to 23% of pre-distress firm value.

[4] For example, wages account for roughly two-thirds of national output in the U.S. economy (Source: Bureau of Economic Analysis).

[5] The consequences of bankruptcy on workers also include pension losses, psychological and social costs, and others. These costs are typically unavailable due to data constraints (Davis and von Wachter, 2011). This paper thus focuses on the wage loss due to bankruptcy.

follow individual workers over time across employers observing their wages and other characteristics of employment relations such as industry and geographical location. Given that a significant fraction of workers leave the firm after a bankruptcy filing (Hotchkiss, 1995), observing worker outcomes independent of post-bankruptcy employers is crucial for precisely estimating the labor impact of bankruptcy.

Using 190 bankruptcy filings by public firms from 1992 to 2005 and following approximately 453,000 workers who were employed by bankrupt firms across the U.S., we find that employee wages begin to deteriorate during the year of bankruptcy filings. By two years after bankruptcy, the decline in annual wages for an average worker is roughly 30% of her wages in five to six years before a bankruptcy filing. The present value of wage losses from the year of bankruptcy to five years after bankruptcy amounts to 63.5% of pre-bankruptcy annual wages for the average employee. Furthermore, we find that less than one-fourth of the employees of the bankrupt firm stay with the firm, and only 40% of them remain in the same local labor market (i.e., county) by three years after a bankruptcy filing. Thus, corporate bankruptcy appears to have significant impacts on workers' earnings and mobility.

Existing theories provide several explanations for the significant wage losses following corporate bankruptcy. First, firm- or industry-specific human capital (Becker, 1962; Neal, 1995) or good matches between employees and employers (Jovanovic, 1979) are lost when workers separate from the previous firm or industry (Topel, 1991). Second, the previous employer may have paid a premium over the market prevailing wage (or marginal value of product) in order to induce unobservable efforts (Lazear, 1981), to screen workers on their ability (Harris and

Holmstrom, 1982), or due to union bargaining power (Robinson, 1989). In these settings, if the workers' post-bankruptcy jobs pay market wages, they are likely to experience wage declines.[6]

After documenting the significant impact of bankruptcy on worker earnings and employment, we examine the implications of the wage loss for corporate policies, specifically capital structure. Building upon previous theoretical research arguing that wage losses upon bankruptcy would indirectly affect capital structure decisions (Titman, 1984; Berk, Stanton, and Zechner, 2010), we first attempt to quantify the indirect costs of financial distress due to the expected earnings losses in financial distress.

In particular, we estimate these costs in terms of "compensating wage differentials" – additional compensation for the risk of experiencing wage loss in financial distress (Abowd and Ashenfelter, 1981; Topel 1984; Agrawal and Matsa, 2013). In a competitive labor market, employees of highly levered firms should be compensated more (relative to those of less levered firms) for the risk of wage loss due to a larger likelihood of financial distress (Berk et al., 2010). This cost in turn gives firms a disincentive to take on leverage. To the extent that workers anticipate potential wage losses due to financial distress and the expected earnings loss is ultimately borne by the firm, this approach is likely to provide reasonable estimates for the *ex-ante* indirect cost of distress related to wage losses.[7]

We find that employees in highly levered firms indeed are paid higher wages. We also find that the expected cost of additional compensation for bankruptcy-driven wage loss is about

[6] For employees who stay with the bankrupt firm post-bankruptcy, the mechanisms for wage losses may be different (e.g., bargaining down wages at distressed employers and low productivity). We separately examine wage changes for workers who keep being employed by the bankrupt firm and those who leave the firm in Section 3.2.

[7] Agrawal and Matsa (2013) point out that even if workers may 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 from other aspects of the economic conditions. In addition, Brown and Matsa (2015) find that job seekers accurately perceive firms' financial health, suggesting that firm employees likely perceive the effect of financial health on their job security as well (or even more accurately).

1.14% to 1.97% of firm value for the average BBB-rated firm. This additional cost of distress can account for 22% to 38% of the tax benefits of corporate debt estimated in previous research (e.g., Graham, 2000; Almeida and Philippon, 2007). Moreover, across firms with different levels of credit ratings and leverage, the magnitude of the ex-ante wage premium due to the "human capital risk" is a significant fraction of the tax shields. Therefore, our results suggest that taking human costs of bankruptcy into account can potentially explain the "debt conservatism puzzle."

Our findings have important implications for at least three strands of literature. First, our paper adds to the empirical literature in financial economics and law 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). However, relatively less attention has been paid to the consequences of bankruptcy for employees, partly due to limitations in data on workers and employment relations. To the best of our knowledge, this paper is the first to use worker-firm matched micro data and to quantify labor market outcomes for workers after bankruptcy filings of firms.[8] Moreover, given the active debate in law and finance as to the efficacy of Chapter 11 as a means to reorganize businesses and to protect employees, the

[8] Eckbo and Thorburn (2003) and Eckbo, Thornburn, and Wang (2012) estimate earnings losses due to bankruptcy for Swedish and U.S. CEOs, 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 uses individual worker-level data to estimate worker wage losses across a broad sample of financially distressed firms.

results in our paper would improve our understanding of the beneficiaries of the Chapter 11 bankruptcy process.[9]

Second, by estimating the labor-related indirect cost of financial distress, this paper contributes to the corporate capital structure literature. We show that the expected costs of financial distress that incorporate the cost implied by employee wage losses could be of a substantial fraction of the tax benefit of debt (Graham, 2000). Furthermore, our results provide an important underpinning for theories arguing that the risk of losing human capital due to bankruptcy is a key driver of corporate leverage choices. Models of Titman (1984), Jaggia and Thakor (1994), and Berk, Stanton, and Zechner (2010) show that this concern for labor should be a consideration for ex-ante employer capital structure choices. Agrawal and Matsa (2013) and Kim (2015) show consistent evidence on corporate leverage choices. Our paper contributes to this literature by showing that employees suffer significant wage declines in financial distress, and bankruptcy in particular, which is a key presumption of this line of research.

Third, our paper contributes to the larger literature in labor economics that examines displaced employees' wage loss (e.g., Jacobson, LaLonde, and Sullivan, 1993; Couch and Placzek, 2010; Davis and von Wachter, 2011). The literature on job displacement focuses on wage loss for workers who left jobs due to a plant or firm closure or because their position was abolished. In contrast, the fundamental purpose of Chapter 11 is to prevent a debtor (i.e., firm) from going into liquidation that could result in the loss of jobs and the misuse of economic resources (Supreme Court, *NLRB v. Bildisco & Bildisco,* 1984). As such, a majority of Chapter 11 firms are not closed but continue operating through restructuring or mergers and

[9] 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."

acquisitions. For example, Bharath, Panchapagesan and Werner (2010) find that only 18.8% of Chapter 11 firms are liquidated. Moreover, workers could stay with the Chapter 11 firms through the bankruptcy process. We find that about 25% of workers stay with bankruptcy firms even 3 years after bankruptcy announcements. Therefore, the impact of bankruptcy on employees' wage loss is more confounding than simple job displacements. The results in our paper advance the literature by showing that both workers who stay with and those who leave the firm post-bankruptcy experience substantial earnings losses, suggesting that financial distress of a firm has negative effects on its employees beyond job displacements.

The rest of the paper proceeds as follows. The next section describes the data, variables, and summary statistics. Results, implications, and robustness tests 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 our results. The last section concludes.

2. Data and Summary Statistics

2.1 Sample Selection

We begin by identifying corporate bankruptcy cases from the UCLA-LoPucki Bankruptcy Research Database (BRD).[10] This database has been used in the literature to study corporate bankruptcy (e.g., Eckbo et al., 2012; Goyal and Wang, 2012; Jiang et al., 2012; Wang, 2009). The BRD contains public companies with more than $100 million of assets

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

(measured in 1980 dollars) that filed cases under Chapter 11 of the U.S. Bankruptcy Code from October 1, 1979 to present.[11] We exclude financial and utilities firms based on their SIC codes.

We merge these Chapter 11 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 and provides detailed information on worker-firm matches (i.e., employment relationships) such as wages, industries, and geographical locations of employment and worker-level characteristics such as age, education, and gender.[12] We link datasets from the LEHD infrastructure with other Census Bureau business datasets, and subsequently with Compustat and CRSP using the Business Register Bridge (BRB). 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 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.

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

[11] The sample period starts after 1979 to ensure that sample firms fall under the 1978 Bankruptcy Reform Act, which marked a substantial change to U.S. bankruptcy law. 1978 Bankruptcy Reform Act established the current system of federal bankruptcy courts and the regime of Chapter 11 reorganization, and became effective on October 1, 1979.

[12] See p. 15 of the following document for the list of states covered by LEHD as of August 2008: http://lehd.did.census.gov/led/library/tech_user_guides/overview_master_zero_obs_103008.pdf.

older than 55 or younger than 20 in the year before a bankruptcy filing. Furthermore, to exclude workers who have little attachment to the firm, we focus on workers with at least two years of tenure with the bankrupt firm one year before its Chapter 11 filing. These workers presumably have accumulated (specific) human capital at the time of bankruptcy filing (Jacobson, LaLonde, and Sullivan, 1993).[13]

Because wage is our key variable, here we provide some details on the wage information in the LEHD. Based on 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 (and to the mid-1980s for some states). 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 record is retained in the database as long as the worker earns at least one dollar of UI-covered earnings during a given quarter in the LEHD universe. According to the Bureau of Labor Statistics, UI coverage is broad and comparable across states. For example, UI covered 96% of total jobs and covered workers received 92.5% of the wage component of national 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 of the states, employer contributions to certain deferred compensation plans, such as 401(K), are included in total wages.[14]

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 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,

[13] Robustness tests based on longer tenure (e.g., workers with six or more years of tenure with the bankrupt firm one year before its Chapter 11 filing) give similar results. See Section 3.2.3.
[14] See www.bls.gov/opub/hom/homch5_b.htm at the Bureau of Labor Statistics.

annual payroll, industry classifications, geographical location (at the county or zip code level), and parent firm identifiers. Given that the LEHD program provides employment data only for the 30 states, the LBD is useful to obtain more comprehensive data on employment at bankruptcy firms.

Lastly, we merge the Chapter 11 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 250 employees are always included in the ASM while 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 total value of shipments, capital stock and investment, labor hours, and material costs. These data are useful when we estimate the impact of corporate bankruptcy on average and per-hour wages and work hours for workers who remain with the bankrupt firm after a filing.

2.2 Summary Statistics

Table 1 presents summary statistics on bankrupt firms. These statistics are based on data from their latest fiscal year before bankruptcy. Panel A shows that during the sample period from 1992 to 2005, 190 out of 457 (41.6%) bankrupt events from the BRD with Compustat information have matched workers from the LEHD.[15]

[15] The LEHD program covers the period from 1985 to 2008, although the coverage of a few "large" states became more comprehensive in the 2000s. Since we require pre-bankruptcy information on wages, bankruptcy events in the final sample begin from 1992. Hence, the match rate is reasonable given that LEHD covers 30 states and even fewer states in earlier periods.

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. The panel shows that the bankrupt firms in the LEHD are on average larger than the full sample of bankruptcy firms from the BRD in terms of sales, book and market assets, market equity, and the number of employees.[16] This characteristic is sensible given that larger firms are more likely to have employees across the states and thus 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. In addition, compared to the full BRD firms, the bankrupt firms in the LEHD have higher labor intensity (as measured by the ratio of total employee wages to assets) and pay a lower wage per worker. Panel B further compares the distribution of bankruptcy outcomes. The distribution of bankruptcy outcomes is similar between the LEHD matched and full samples. For example, the proportion of Chapter 11 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 group based on a propensity score approach. The propensity score is computed using the following variables: log (book assets), book and market leverages, return on assets (ROA), market-to-book, log (wage per worker), and year and industry fixed effects. The matched firms are used to filter out the potential effect of factors that are common in both the treated firms and counterfactuals. The statistics show

[16] The Census Bureau does not permit disclosing median values.

that firms in the treatment group and the propensity-score matched group are statistically equivalent in terms of key characteristics.

Panel D shows the dynamics of firm characteristics five to one years before bankruptcy filings. Over the five years prior to bankruptcy, book leverage ratios increase from 0.31 to 0.61, and ROA, a proxy for profitability, declines from 0.14 to 0.04. The market-to-book ratio also declines from 1.7 to 1.1. The ratio of total wages to book assets experience large declines from 0.60 in t-5 to 0.34 in t-1. These trends indicate that an increase in financial leverage and a significant deterioration in profitability and firm value before Chapter 11 filings.

Table 2 presents summary statistics on employees of the bankrupt and control firms measured in one year prior to bankruptcy filings using information from the LEHD. The worker characteristics are well balanced between the bankruptcy and the propensity-score matched control workers. In addition, we follow the literature (e.g., von Wachter, Song, and Manchester, 2009; Couch and Placzek, 2010; Davis and von Wachter, 2011) and construct an alternative control sample of employees who are i) employed by non-bankrupt firms and ii) not displaced from an employer. Due to computational constraints, we only use randomly selected 1% workers from the LEHD universe who satisfy the criteria as a "random" 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. Table 2 shows that while some worker characteristics including age and years of experience are statistically different between the treatment and the random control groups, other characteristics are similar across the two groups. These characteristics prior to the events suggest that the propensity-score matched group of workers are likely to serve as a better counterfactual of the treatment group than the randomly picked control group.

Table 2 further shows that proportions of employees staying in the firm, industry, or county post-bankruptcy are significantly different between the treatment and control firms. Employees of bankrupt firms are significantly less likely to stay in and more likely to leave the firm, industry, and county they were in before bankruptcy. About 75% of the employees leave the bankrupt firm, 60% leave the industry of the bankrupt firm, and 60% leave the county in which the pre-bankruptcy job was at. In contrast, only 60% of the employees in the matched control firms change the firm, 50% switch the industry, and 50% leave the county, all of which are statistically different from those of the treatment group. To the extent that worker mobility at the firm, industry, and geographical levels is costly to workers (Farber, 1999), this result suggest employees of bankrupt firms are likely to suffer lower wages relative to similar workers in the counterfactual groups.

[Table 2 about here]

3. Empirical Results

3.1 Difference-in-Difference Estimates of Wage Loss in Bankruptcy

To analyze the effect of bankruptcy on labor outcomes, we note that factors other than bankruptcy events, such as macroeconomic and industry conditions, or unobserved heterogeneity across workers may drive the changes in wages after bankruptcy. For example, employees of bankrupt firms may have low abilities and thus experience declines in wages. To address concerns of this sort, we use a difference-in-difference approach using a comparison group 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:

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

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, years of education × years of experience, and years of experience × gender. We do not include education and gender individually because they are absorbed by the worker fixed effects, and 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 after (or before if k < 0) a bankruptcy filing of the firm and zero otherwise ($-4 \leq k \leq 6$). 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 in the same year. ε_{it} is the error term. The estimates of δ_k capture the change in employee wages of bankrupt companies in each year relative to the wages of the control group, and are our main interest.

[Table 3 about here]

Table 3 presents the regression results controlling for various fixed effects. The control group includes employees of the matched firms based on propensity scores in Panel A and the randomly selected employees of non-bankrupt firms in Panel B. The estimates on the interaction variables $BR_i \times D[k]_{it}$ show that relative to the control group, employees in bankrupt firms experience significant declines in wages during the years after bankruptcy filing. In addition, the lower wages persist several years after bankruptcy. Across all specifications, the coefficients on interaction variables $BR_i \times D[k]_{it}$ are significantly negative at a conventional level in most years from t to t+6. This result suggests that after controlling for observable worker characteristics and fixed effects, there is a significant labor income loss each year

(about 10% compared with the pre-bankruptcy income level) for employees of the bankrupt firms, relative to those of the non-bankrupt firms.

In particular, we use the coefficient estimates on the indicator variables from year 0 to 6 in Table 3 to obtain the magnitude of income loss. For example, the coefficient on D[0] in Column (4) of Table 3 Panel A is -0.072, which is the difference between a log wage in 0 and the average log wage in benchmark years "t-5 and "t-6." This means that the wage in t divided by the benchmark wage is equal to exp(-0.072)=0.93, which implies a 7% decline of wage in year 0 relative to the benchmark wage. We perform the same calculation using the coefficients on the indicator variables from years t to t+6, and then obtain an average annual wage loss of around 10% relative to the benchmark wage and the non-bankrupt firms. The last row in the table shows that the present value of wage losses from years t to t+6 is 62.6% of the pre-bankruptcy annual wage (based on a 5% discount rate).

The following patterns emerge across columns in Table 3. First, specifications with different counterfactual groups and layers of fixed effects give relatively similar estimates of wage loss with the present value ranging from 40 to 118% of pre-event earnings. Second, controlling for industry (× year) or local economy (× year) fixed effects generally reduces the wage loss estimate. This finding suggests that employees of the bankrupt firms lose wages partly because they move to industries or local labor markets in which wage levels are lower. Yet, this mobility pattern does not fully account for a significant wage reduction post-bankruptcy. Third, estimates of wage loss are generally larger in Panel B in which randomly selected workers are used as a counterfactual. This result suggests that controlling for observed employer-level characteristics using a matching approach, for example, is crucial to reduce biases in the wage patterns post-bankruptcy.

Figure 1 visually presents the wage changes each year, based on the coefficient estimates in Column (4) of Table 3 Panel A, which include worker and two-digit SIC industry × year fixed effect and the method described above. The figure shows that the employee wages of bankrupt firms remain nearly flat before year t-1 and then starts to decline in that year (the year before bankruptcy filing). The wage further deteriorates starting in year t. For each year from years t to t+6, the employees lose 8.4% to 13.8% of the pre-bankruptcy wage in t-6 and t-5, relative to the wages of the employees of the matched firms in the respective year.

[Figure 1 about here]

3.2 What Drives Wage Loss after Bankruptcy?

Our main analysis shows a significant decline in wages for employees of bankrupt firms. In this section, we investigate potential mechanisms through which those workers experience significant earnings losses after bankruptcy filings of their employers. Theories suggest that individuals may lose wages following bankruptcy filing of the employer due to i) the loss of firm- or industry-specific human capital (Becker, 1962; Neal, 1995; Topel, 1991), ii) the loss of wage premiums accumulated over the employees' job tenure, and iii) union bargaining power (Robinson, 1989). We empirically investigate these arguments using the conditional analysis below.

3.2.1 Conditional analysis by workers' displacement status

In Table 4, 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

firm/industry/county by year t+3 from her t-1 firm/industry/county. We then run the following regression:

$$y_{it} = \alpha_i + \gamma_t + x_{it}\beta_1 + \sum_{k=-m}^{m} D[k]_{it}\lambda_k + \sum_{k=-m}^{m} BR_i \times D[k]_{it} \times [Switch \times \delta_k + (1 - Switch) \times \theta_k] + BR_i \times \beta_2 + BR_i \times Switch \times \beta_3 + \varepsilon_{it}, \quad (2)$$

where the coefficients δ_k represent the effect of bankruptcy on the wages of the bankrupt firm employees who leave the firm / industry / county, and the coefficients θ_k represent the effect on the wages of the bankrupt firm employees who do not leave the firm / industry / county. For example, estimates in Table 4, (1) and (2) are from one regression, with θ_k corresponding to the estimates in Column (1) and δ_k corresponding to the estimates in Column (2).

[Table 4 about here]

Table 4 Column (1) shows that the coefficients on the event time dummies exhibit generally smaller magnitude in absolute values compared to those in the main regression models in Table 3, indicating that the employees who stay with the bankrupt firms experience a smaller wage loss during the post-bankruptcy period than the average worker of the bankrupt firms. Comparing the estimates in Columns (1) and (2) shows that firm switchers generally lose more wages compared to firm stayers during the years from t to t+3. For example, using the calculation method used in Figure 1 (see the end of Section 3.1), for each year from t to t+6, workers who leave the firm lose on average 17% of their annual wages, while those who stay with the firm lose only 3%.

The regression represented by Columns (3)-(7) further examines workers who leave the industry and the county among those leaving the firm. Columns (3)-(6) are based on the workers who switch firms. The estimates in Column (4) are significantly more negative than those in Column (3). Similarly, the estimates in Column (6) are significantly more negative

than those in Column (5). This finding suggests that among the workers who switch firms, those who also switch their 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%). The estimates in Columns (3) and (5) do not differ significantly, suggesting that for workers who remain in the same industry, switching counties does not make their wages worse. In contrast, the estimates in Column (6) are significantly more negative than those in Column (5). This suggests that among workers who leave the industry, those who leave the county experience a significantly larger wage loss than those who stay in the county (a wage cut of 25% vs. 15%). The difference may be because workers who "have to" leave both the industry and county are "worse" compared to those who switch the industry but stay in the same local area (i.e., negative selection). In all, the results in Table 4 suggest that loss of firm- and industry-specific human capital (which is presumably lost once workers leave a firm and industry) and worker selection in mobility across firms, industries, and local markets accounts for a significant part of the wage losses.

3.2.2 Conditional analysis by labor market conditions

Table 5 examines the employees' wage loss conditional on the status of the workers' labor market. In Panel A, we find that the "size" of labor markets matters for wage losses after bankruptcy. We measure the size of the local (national) labor market using the number of establishments in the county-industry (industry) in columns 1 to 4 from the LBD. In particular, wage losses are smaller in larger (greater than the sample median) labor markets in which workers from bankrupt firms can find jobs more easily using the same skill (Kim, 2015). They can also more easily find jobs located in the same area when a "local" labor market is larger. The size of population in counties, in contrast, doesn't matter for wage losses. In Panel B, local

(i.e., county-level) unemployment rates matter for wage losses, with lower unemployment rates being related to less wage loss. The results in this table complement those in Table 4 by showing that the loss of firm- and industry-specific human capital (which is mitigated in larger markets) accounts for a significant part of the wage losses. Moreover, the result for local labor market conditions (in terms of size and unemployment rate) suggests that workers' job search and reallocation after bankruptcy of the previous employer is likely to concentrate in the local area.

[Table 5 about here]

3.2.3 Conditional analysis by employee and firm characteristics

Table 6 examines the wage loss conditional on employee and firm characteristics. The results show that older workers and workers with longer tenure experience more severe wage cuts after bankruptcy. This difference may be because older and longer-tenure workers earned higher wage premiums due to entrenchment or investment in specific human capital, and these premiums are lost as a result of bankruptcy.

[Table 6 about here]

We also examine whether the magnitude of wage losses varies depending on the extent to which workers are covered by labor unions (columns (5) and (6) in Panel B). 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. Then, we define a dummy variable equals to one if the worker is employed in an industry with an above-median level of collective bargaining coverage, and zero otherwise. The results show that wage losses are larger for employees in industries with higher unionization rates. One plausible explanation for this result is that employees in highly unionized industries are paid

wage premium above the market wage before bankruptcy due to union rents (Freeman and Medoff, 1984). Then, these workers can experience a larger wage loss post-bankruptcy by moving to a less unionized employer or by downward renegotiating of their wages during financial distress (Benmelech, Bergman, and Enriquez, 2012).

Furthermore, the results in Panel B show that workers in smaller firms fare worse in terms of losing more labor income. Workers in smaller firms may have less general (i.e., less redeployable) human capital and thus are more likely to lose their firm- or industry- human capital (Tate and Yang, 2015), which will lead to a greater cut in wages when they are displaced due to bankruptcy. Also, employees of younger firms fare better than those of older firms after bankruptcy, which may be due to young workers matching with young firms more often than older firms (Ouimet and Zarutskie, 2014).

3.3 Additional Subsample Analysis

3.3.1 Bankruptcy Outcomes and Wage Loss

In Table 7, we conduct the analysis conditional on different bankruptcy outcomes. We find that the wage loss is larger for non-emergence cases (columns 1 vs. 2) and for "bad" outcomes such as liquidation or closing down of the firm, and refiling Chapter 11 (columns 3 vs. 4). In addition, when firms are liquidated (columns 5 vs. 6), workers initially suffer more wage loss but recover faster. The result suggests that while liquidation hurts worker outcomes in the short run, it may "benefit" them in the medium to long run by expediting reallocation of workers to new jobs. Thus this finding may shed light on the merit of Ch.11 vs. Ch.7 in terms of preserving employment and wages.

[Table 7 about here]

3.3.2 Manufacturing Plant-Level Evidence

Table 8 includes the results obtained from matching the bankruptcy sample 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. We find that measures of plant-level performance (standardized TFP,[17] margin, and labor productivity) generally show a "V-shape" pattern around a bankruptcy filing. For example, TFP of plants owned by a typical bankrupt firm was 0.06 (of the standard deviation of TFP) higher than its age-size matched peers in the same industry and year, but is 0.07 lower in the year of bankruptcy filing. The change in TFP from years t-4 to t is economically sizeable at -0.13 of the within-industry standard deviation. However, by four years post-bankruptcy, for example, TFP becomes 0.19 higher than the peers with the increase of 0.26. These patterns suggest that performance of plants owned by bankrupt firms deteriorated during years leading to bankruptcy but recover afterwards as the firm restructure under the bankruptcy protection (Maksimovic and Phillips, 1998).

Meanwhile, the average wage per worker decreases significantly post-bankruptcy. Importantly, this decrease in wage seems to be largely driven by a significant drop in working hours around bankruptcy (Column 7), suggesting that a reduction in hours is a key mechanism for a declining wages for average employees of bankrupt firms. The workers' hourly wage rate, in contrast, remains relatively flat around bankruptcy, as shown in Column 5. Finally, Column (6) shows that there is a decline in worker benefits (e.g., pensions, health care) after bankruptcy and the decline is weakly significant.

[Table 8 about here]

[17] We standardize the TFP measure by dividing it by the cross-sectional standard deviation for a given industry-year (Maksimovic, Phillips, and Yang, 2013).

3.3.3 Private Firm Bankruptcy and Wage Loss

The main results in Table 3 and the subsequent conditional analysis are based on a sample of public bankrupt firms. This section examines the wage loss for the employees of private bankrupt firms and reports the results in Table 9. We obtain the data on private bankrupt firms from New Generation Research's bankruptcydata.com.[18] We match these bankruptcy events to the LEHD databases which yields 50 such events from 1999 to 2002. Then we find a matched firm for each of the 50 bankrupt firms from the same year, SIC industry, and firm age, size, and wage groups.[19] We use the employees of these matched firms as the counterfactual of those of the private bankrupt firms in our wage regressions in equation (1).

Comparing with the estimates for public firms in Table 3, the coefficient estimates for private firms present much larger magnitude in Table 9. Based on the estimated coefficients, we estimate that the average annual wage loss over the years from t to t+6 is 29%, which almost triples the size of the average wage loss for public firms calculated in Section 3.1, 10%. Employees in public firms may have higher ability, and more visibility and networks, and thus experience a smaller wage cut when they lose a job from the bankrupt firms. The larger magnitude in wage loss of private firms, however, could also be attributed to the firm size effect (see Table 6, Panel C).

[Table 9 about here]

[18] Bankruptcydata.com selected detailed information for 235 private company filings with public debt or that they have deemed significant and newsworthy from 1999 to 2002.
[19] Specifically, we first search the same 3-digit SIC industry, and 2-digit industry if we do not find a match. We use 10 bins for the average wages, 12 bins for firm size, and five bins for firm age.

4. Wage Loss and Capital Structure

The literature on compensating wage differentials suggests that employees exposed to higher risk of wage loss (due to e.g., unemployment, transition to lower paying jobs) would demand a wage premium to compensate for the risk (Abowd and Ashenfelter, 1981; Topel, 1984). In particular, when the firm has a significant risk of distress due to high financial leverage, the employees would need to be paid a premium in wages or benefits in a competitive labor market. This wage premium, therefore, is part of the financial distress costs for a distressed firm (see Agrawal and Matsa (2013), Brown and Matsa (2015), and Chemmanur et al. (2012) for evidence in capital structure contexts). In this section, we first investigate whether employees of the firm with a greater financial distress risk are indeed paid high wage, other things held constant (4.1), and then how to translate the ex-post wage loss employees experience post-bankruptcy into the ex-ante "human" cost of financial distress for the company (4.2). The latter will have potential implications for the choice of corporate capital structure.

Before going into the details of estimating wage premiums as financial distress costs, we emphasize that using compensating wage differentials may not be the only approach to translate the ex-post wage loss for employees into ex-ante cost of corporate debt. For example, employees of a highly-leveraged firm might optimally choose to invest less in their firm-specific human capital, which reduces their productivity (Jaggia and Thakor, 1994). Highly levered firms may also lose high-quality employees or job candidates to competing firms with lower leverage due to poor job stability (Brown and Matsa, 2015). The bottom line is that as long as employees anticipate the effects of the firm's financial health on the stability of their jobs, the firm would ultimately bear the costs associated with potential wage loss in a

competitive labor market. Our approach based on compensating differentials provides a straight-forward, yet sensible way to quantify the indirect cost of distress to the firm.

4.1 Financial Distress Risk and Employee Wages

In this section, we estimate a standard wage equation augmented by proxies for financial distress risk of the firms 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 $\alpha_{j\times c\times t}$ is industry (indexed by *j)* times county (indexed by *c*) times year (indexed by *t*) fixed effects, $\log(\text{wage})_{it}$ is log annual real wage, distress risk_{it} is a proxy for financial distress risk of the employer, X_{it} is a set of worker-level control variables including interaction terms between sex and education, and work experience, 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 from 1986 to 2008 that are matched with firm-level information from Compustat with credit ratings above 'CCC+.'[20] This procedure yields about 6.8 million worker-years.

The results in Table 10 Panel A show that firms with higher leverage ratios (and thus greater risk of financial distress) are associated with higher employee wages. For example, the coefficient on market leverage in column 2 suggests that a 10 percentage point increase in leverage ratio is associated with 2.25% increase in annual wage of employees. This result based on wage data for individual workers from the LEHD employed by public companies is

[20] The 10% random sampling is to reduce computational burden in estimating the wage equation with a large number of fixed effects, and thus is innocuous for the results. In addition, conditioning on credit ratings higher than 'CCC+' is to ensure that the firms are not in (or close to) financial distress.

consistent with the results presented in Chemmanur, Cheng, and Zhang (2012) which are based on the firm-level aggregate wage data as well as individual top executive pay data. Panel A also shows that firms with lower Z-scores (and thus more distressed) are weakly associated with higher wages.

Panel B shows the result for a subsample analysis by credit ratings. The reported results show that the positive association between financial distress risk and employee wages are only significant in firms with ratings that are lower than 'A-.' That is, wage premiums for distress risk arise only in the firms that are more likely to default. In financially heathy firms with high credit ratings, an increase in financial distress risk does not affect wages demanded by workers because the (marginal) risk of wage loss due to bankruptcy is practically negligible in such firms. Panels C and D further show that the positive link between financial distress risk and wages is present only in highly levered or low market-to-book firms. Overall, the result is consistent with compensating wage differentials accounting for the wage loss risk and a convex relation between financial leverage and distress probability.

[Table 10 about here]

4.2 Estimating "Human Costs of Bankruptcy"

In this section, we first use our main regression estimates in Table 3 to provide a back-of-the-envelope estimate of the present value of wage losses (relative to firm value). Table 1 Panel D shows that the average real wage per worker for bankrupt firms is $36,269 in t-5. Based on the regression coefficients in Table 3, Panel A, Column (4) and assuming a 5% real discount rate, Table 11 shows that the present value of wage losses per worker from t to t+6 is equal to $22,699. In addition, the number of employees at t-5 is 11,135 for an average bankrupt

firm. Hence, the total present value of wage loss for an average firm is $252.75 million (= $22,699 × 11,135). Given that the average market value of assets for sample firms is about $1,745 million in t-1 ($1,176 million in t-5), the present value of wage losses for years t to t+6 as a ratio to firm value ranges from 14% (if using market assets in t-1) to 21% (if using market assets in t-5), suggesting a significant employee wage loss due to bankruptcy relative to firm value.

[Table 11 about here]

The estimates in Table 11 give us an idea of the magnitude of ex post personal costs of bankruptcy. In a competitive labor market, an employee of a firm with a larger ex post wage loss due to bankruptcy would require a wage premium ex ante, or else the employee will work for a firm that has a lower expected wage loss, all else equal. In order to examine the implication of the *ex post* wage loss estimates for a firm's *ex ante* capital structure choice, we need to translate these numbers into an *ex ante* wage cost for firms induced by their use of leverage.

To convert the ex post wage loss into the ex ante wage premium, we follow an approach similar to that in Almeida and Philippon (2007) and derive the present value of wage loss, using a simple valuation tree and the risk-adjusted default probability. Appendix B provides the details of the approach. The basic idea is as follows: Anticipating potential personal bankruptcy costs (i.e., wage losses), an employee would demand the same risk-adjusted present value of expected wages from two firms with different bankruptcy probabilities (all else equal). Our result is intuitive: The present value of additional ex-ante wage premium should be equal to the increase in the present value of the expected wage loss due to bankruptcy.

Furthermore, we use the risk-adjusted probability of default from Almeida and Philippon (2007) in estimating the wage costs for the sample of the firms that actually filed for Chapter 11 bankruptcy protections. The probability of default is certainly larger than the probability of bankruptcy filings. We thus need the probability of Chapter 11 bankruptcy conditional on default to convert the probability of default into the probability of Chapter 11. The expected wage loss due to bankruptcy is then equal to the wage loss conditional on bankruptcy multiplied by the (risk-adjsuted) probability of Chapter 11.[21] Using the Moody's Default and Recovery Database (DRD), we find that 50% of default firms file Chapter 11. Thus, we assume that the probability of Chapter 11 bankruptcy conditional on default equals to 50%.

Table 12 provides the estimation results of wage premiums by credit ratings. An accurate estimation of the wage premium requires information on the expected tenure of employees at potentially bankrupt firms. A recent report by the Bureau of Labor Statistics shows that the median number of years that workers had been with their current employer is 4.6 in January 2012.[22] Note, however, that the *expected* tenure of workers is likely longer than the *realized* average tenure of current employees given their expected future employment in the current firm. Thus, we examine the robustness of our estimation by computing the wage premiums assuming periods ranging from two to ten years, as well infinite number of years which serves as the upper bounds of the wage premium. For each of the credit rating groups, we calculate the wage premium as a percentage of the market value of assets, and then

[21] Note that this implicitly assumes that there is no wage loss for defaults that do not lead to bankruptcy. This could lead to under-estimation of wage loss if defaults that do not lead to bankruptcy also entail wage loss for employees.
[22] See http://www.bls.gov/news.release/pdf/tenure.pdf.

compare the premiums with the estimates of the costs of financial distress and the tax benefit of debt provided by Almeida and Philippon (2007) and Molina (2005).

[Table 12 about here]

Column 1 of Panel B in Table 12 provides the tax benefits of debt reported in Almeida and Philippon's (2007) Table VI, Panel A. Columns 2 to 6 show our calculation of wage premiums for two, five, ten and infinite years of expected tenure, respectively. We find that the wage premiums could offset a significant fraction of tax benefits and the magnitude depends on the rating of firms. For an average AAA-rated (BBB-rated) firm, tax benefits of debt equal to 0.47% (5.18%) of firm value, while wage premiums for workers with 5 years of expected tenure are 0.05% (1.14%) of firm value. Therefore, wage premiums offset 11% (22%) tax benefits of debt for AAA (BBB) rated firms under the assumption on tenure. The fractions are higher for lower-rated firms. For BB and B rated firms, wage premiums could offset 29% and 39% of tax benefits. Overall, our results indicate that wage premiums for distress risk are an important component of financial distress costs, especially for lower rated firms, and thus a determinant of corporate capital structure.

5. Discussions of Wage Loss Estimates

First, we discuss how to handle wages of workers who "disappear" from the LEHD databases. Since the LEHD data draw from the state-level unemployment insurance records, some of the workers who disappear from the LEHD databases may become unemployed with (close to) zero earnings. Or, some other workers may move to the states not covered by the LEHD (there are 21 such states including D.C.) and are re-employed earning positive wages.

To address this issue of worker attrition from the sample, we impute unobserved potential wages using two approaches. First, we assume zero wages for workers who disappear from the LEHD in Columns (1)-(2) of Table 13. Second, we assume that unobserved workers post-bankruptcy earn the last available wage from the LEHD in Columns (3)-(4). Then we compute "adjusted" wage losses considering these imputations. The result from the zero-wage assumption may be considered an upper bound for wage losses, while the result using the last available-wage may be a lower bound for wage losses.[23] The reported results show that with the assumption of zero wages conditional on disappearance, employees appear to experience a much larger magnitude of wage losses compared with the main regression results in Table 3. In contrast, when the missing wages are imputed using the last observed values, the wage loss becomes much smaller and insignificantly different from zero.

[Table 13 about here]

Second, high leverage could lead to financial distress, but not necessarily bankruptcy. For example, firms in financial distress could resolve the distress through out-of-court private workout. In this paper, we estimate the human capital loss resulting from bankruptcy (i.e., Chapter 11) filings. Because firms that file for Chapter 11 could experience more severe financial distress than firms that choose a private workout, our estimates for worker wage losses conditional on Chapter 11 may be larger than estimates for lost wages conditional on more general financial distress.

Third, our study does not distinguish whether bankruptcy is caused by financial distress (e.g., the firm's financial positions deteriorate due to high debt burden even if its underlying operations remain strong), economic distress, or both. Our sample firms have an average

[23] However, they may not be exactly lower and upper bounds given that the counterfactual group's wages are also imputed.

leverage ratio as high as 61% one year prior to bankruptcy (see Table 1), suggesting that the firms may be in financial distress. At the same time, the average ROA (whose numerator is EBITDA) is 4%, lower than the average ROA for Compustat firms (about 10%). These statistics indicate that bankrupt firms in our sample may experience both financial and operational distresses.

The comparison of wage loss estimates in Table 3, Panels A and B which use employees of matched firms and randomly selected workers as a counterfactual can give an idea of the effect of economic distress on worker wages. In particular, given that Panel A controls for the economic performance (proxied by ROA) and market valuation (market-to-book) of firms in the (propensity score) matching process, the estimates based on the sample is less likely to be affected by economic distress of the firm. In fact, we find that the present value of wage loss is about 63% using the matched sample vs. 87% using the random sample, indicating that controlling for the economic performance of the firm refines (i.e., reduce) estimate loss estimates.

Fourth, it is possible that firms that file for bankrupt 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 bankruptcy in this manner, our estimates of wage losses may understate the costs of financial distress for the entire universe of firms (see Glover (2015) for a similar argument).

Finally, other factors may lead to under-estimation of wage losses. For example, we truncate our PV (wage loss) estimation at t+6. For example, to the extent to which wage losses persist in the long run, including wage loss beyond t+6 may increase the magnitude. Our estimates also ignore other non-pecuniary personal costs of bankruptcy, such as psychological

costs and health and family problems due to a reduction in wages and reallocating jobs across different geographical areas.

6. Conclusion

This study quantifies the human costs of bankruptcy. We find that employee wages start to deteriorate at bankruptcy and the decline in wages persists at least for six years after bankruptcy. The magnitude of the decline in annual wages one year after a bankruptcy filing is about 10% of pre-bankruptcy wages leading to about 63% of annual wage lose in present value. In addition, after corporate bankruptcy, a majority of employees leave the firm, industry, and local labor market to which there were previously attached. Using the estimated personal costs of bankruptcy, we provide an estimate of total wage losses relative to firm value. We then convert the ex-post wage loss into an ex-ante wage premium from the perspective of the firm. We find that for the average firm, the ex-ante wage premium is of a significant fraction of the tax benefits of corporate debt. The analysis in this paper thus suggests that the cost of debt associated with employee wage losses in financial distress could potentially explain the conservative debt usage by U.S. corporations.

References:

Abowd, John M., and Orley C. Ashenfelter, 1981, Anticipated Unemployment, Temporary Layoffs, and Compensating Wage Differentials, NBER Chapters, in: Studies in Labor Markets, pages 141-186 National Bureau of Economic Research, Inc.

Abowd, John M., Bryce E. Stephens, Lars Vilhuber, Fredrik Andersson, Kevin L. McKinney, Marc Roemer, and Simon Woodcock, 2005, U.S. Census Bureau, LEHD Program, Technical Paper No. TP-2006-01.

Agrawal, Ashwini K., and David A. Matsa, 2013, Labor Unemployment Risk and Corporate Financing Decisions, *Journal of Financial Economics* 108, 449-470.

Almeida, Heitor, and Thomas Philippon, 2007, The Risk-Adjusted Cost of Financial Distress, *Journal of Finance*, 62-6*,* 2557-86

Altman, Edward I., 1984, A Further Empirical Investigation of the Bankruptcy Cost Question, *Journal of Finance*, 39-4*,* 1067-89

Andrade, Gregor, and Steven N. Kaplan, 1998, How Costly is Financial (not Economic) Distress? Evidence from Highly Levered Transactions that Became Distressed, *Journal of Finance*, 53-5*,* 1443-93.

Ayotte, Kenneth M., and Edward R. Morrison, 2009, Creditor Control and Conflict in Chapter 11, *Journal of Legal Analysis*, 1-2, 511-51.

Becker, Gary S., 1962, Investment in Human Capital: A Theoretical Analysis, *Journal of Political Economy*, 70-5, 9-49.

Benmelech, Efraim, Nittai K. Bergman, and Ricardo J. Enriquez, 2012, Negotiating with Labor under Financial Distress, *Review of Corporate Finance Studies* Forthcoming.

Berk, Jonathan, Richard Stanton, and Josef Zechner, 2010, Human Capital, Bankruptcy, and Capital Structure, *Journal of Finance*, 65-3, 891-926.

Bharath, Sreedhar, Venky Panchapegesan, and Ingrid Werner, 2010, The Changing Nature of Chapter 11, Working paper, Arizona State University.

Brown, Jennifer and David Matsa, 2015, Boarding a Sinking Ship? An Investigation of Job Applications to Distressed Firms, forthcoming, *Journal of Finance.*

Chemmanur, Thomas J., Yingmei Cheng, and Tianming Zhang, 2012, Human Capital, Capital Structure, and Employee Pay: An Empirical Analysis, *Journal of Financial Economics*, 110-2, 478-502.

Couch, Kenneth A., and Dana W. Placzek, 2010, Earnings Losses of Displaced Workers Revisited, *American Economic Review*, 100-1, 572-589.

Davis, Steven J., and Till von Wachter, 2011, Recessions and the Costs of Job Loss, *Brookings Papers on Economic Activity* 1-72.

Eckbo, B. Espen, and Karin S. Thorburn, 2003, Control Benefits and CEO Discipline in Automatic Bankruptcy Auctions, *Journal of Financial Economics*, 69, 227-58.

Eckbo, B. Espen, Karin S. Thorburn, and Wei Wang, 2012, How Costly is Corporate Bankruptcy for Top Executives?, Working Paper, Tuck School of Business at Dartmouth.

Farber, Henry S., 1999, Mobility and stability: The dynamics of job change in labor markets, Chapter 37 in *Handbook of Labor Economics*, 1999, vol. 3, Part B, 2439-2483, Elsevier.

Freeman, R., and J. Medoff. 1984. What do unions do? New York: Basic Books.

Gilson, Stuart, 1989, Management Turnover and Financial Distress, *Journal of Financial Economics*, 25, 241-262.

Glover, Brent, 2015, The Expected Cost of Default, *Journal of Financial Economics* Forthcoming.

Goyal, Vidhan K., and Wei Wang, 2012, Provision of Incentives in Chapter 11 Firms, Working Paper, Hong Kong University of Science and Technology.

Graham, John R., 2000, How Big are the Tax Benefits of Debt?, *Journal of Finance*, 55-5, 1901-41.

Hamermesh, Daniel S., and John R. Wolfe, 1990, Compensating Wage Differentials and the Duration of Wage loss, *Journal of Labor Economics*, 8-1, S175-S197.

Harris, Milton, and Bengt Holmstrom, 1982, A Theory of Wage Dynamics, *Review of Economic Studies* 49, 315-333.

Hirsch, Barry T. and David A. Macpherson, 2003, Union membership and coverage database from the current population survey: Note, *Industrial and Labor Relations Review* 56, 349–54.

Hotchkiss, Edith S., 1995, Post-bankruptcy Performance and Management Turnover, *Journal of Finance*, 50, 3–21.

Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan, 1993, Earnings Losses of Displaced Workers, *American Economic Review*, 83-4, 685-709.

Jaggia, Priscilla B., and Anjan V. Thakor, 1994, Firm-Specific Human Capital and Optimal Capital Structure, *International Economic Review*, 35-2, 283-308.

Jiang, Wei, Kai Li, and Wei Wang, 2012, Hedge Funds and Chapter 11, *Journal of Finance*, 67, 513-60.

Jovanovic, Boyan, 1979, Job Matching and the Theory of Turnover, *Journal of Political Economy*, 87-5, 972-90.

Lazear, Edward P., 1981, Agency, Earnings Profiles, Productivity, and Hours Restrictions, *American Economic Review,* 71, 606-620.

LoPucki, Lynn M. and William C. Whitford, 1992, Patterns in the Bankruptcy Reorganization of Large, Publicly Held Companies, *Cornell Law Review* 78, 597.

Kim, Hyunseob, 2015, How Does Labor Market Size and Firm Capital Structure? Evidence from Large Plant Openings, Working paper, Cornell University.

Maksimovic, Vojislav and Gordon Phillips, 1998, Asset Efficiency and Reallocation Decisions of Bankrupt Firms, *Journal of Finance*, 63-5, 1495-532.

Maksimovic, Vojislav, Gordon Phillips, and Liu Yang, 2013, Private and Public Merger Waves, *Journal of Finance*, 68, 2177–217.

Molina, Carlos A. 2005, Are Firms Underleveraged? An Examination of the Effect of Leverage on Default Probabilities, *Journal of Finance*, 60-3, 1427-59.

Neal, Derek, 1995, Industry-Specific Human Capital: Evidence from Displaced Workers, *Journal of Labor Economics* 13, 653-677.

NLRB v. Bildisco & Bildisco, 465 U.S. 513, 527-28 (1984)

Ouimet, Paige and Rebecca Zarutskie, 2014, *Journal of Financial Economics* 112, 386-407.

Ondersma, Chrystin, 2009, Employment Patterns in Relation to Bankruptcy, *The American Bankruptcy Law Journal,* 83, 237-251.

Opler, Tim C., and Sheridan Titman, 1994, Financial Distress and Corporate Performance, *Journal of Finance*, 83-5, 1015-40.

Pulvino, Todd C., 1998, Do Asset Fire Sales Exist? An Empirical Investigation of Commercial Aircraft Transactions, *Journal of Finance*, 53-3, 939-78.

Pulvino, Todd C., 1999, Effects of Bankruptcy Court Protection on Asset Sales, *Journal of Financial Economics*, 52, 151-86.

Ramey, Valerie A., and Matthew D. Shapiro, 2001, Displaced Capital: A Study of Aerospace Plant Closings, *Journal of Political Economy*, 109-5, 958-92.

Robinson, Chris, 1989, The Joint Determination of Union Status and Union Wage Effects: Some Tests of Alternative Models, *Journal of Political Economy*, 97-3, 639-67.

Ruhm, Christopher J., 1991, Are Workers Permanently Scarred by Job Displacements?, *American Economic Review*, 81-1, 319-24.

Senbet, Lemma W., and Tracy Yue Wang, 2012, Corporate Financial Distress and Bankruptcy: A Survey, *Foundations and Trends in Finance Forthcoming.*

Shleifer, Andrei, and Robert W. Vishny, 1992, Liquidation Values and Debt Capacity: A Market Equilibrium Approach, *Journal of Finance*, 47-4, 1343-66.

Tate, Geoffrey and Liu Yang, 2015, The Bright Side of Corporate Diversification: Evidence from Internal Labor Markets, *Review of Financial Studies* 28, 2203–49.

Titman, Sheridan, 1984, The Effect of Capital Structure on a Firm's Liquidation Decision, *Journal of Financial Economics*, 13, 137-51.

Topel, Robert H., 1984, Equilibrium Earnings, Turnover, and Unemployment: New Evidence, *Journal of Labor Economics* 2, 500-522.

Topel, Robert H., 1991, Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority, *Journal of Political Economy*, 99-1, 145-76.

von Wachter, Till, Jae Song, and Joyce Manchester, 2009, Long-Term Earnings Losses due to Mass Layoffs During the 1982 Recession: An Analysis Using U.S. Administrative Data from 1974 to 2004, Working paper, Columbia University.

Wang, Jialan, 2009, The Role of Human Capital in Corporate Bankruptcy, Working Paper, Washington University in St. Louis.

Warner, Jerold B., 1977, Bankruptcy Costs: Some Evidence, *Journal of Finance*, 32-2, 337-347.

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
M2B	Market to book = (total debt + market value of equity)/(total debt + book equity)
N. emp (CS)	Number of employees in a firm, obtained from Compustat
N. emp (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
Female	An indicator variable equal to one if the worker is female, and zero otherwise
Experience	Years of work experience
Educ	Years of education
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

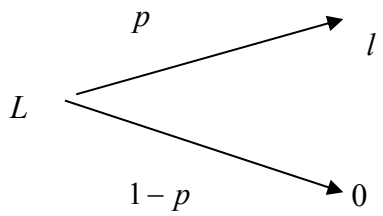
Conditional variables	
LeaveFirm / LeaveInd / LeaveCounty	An indicator variable equal to one if her firm / industry / county is different by year t+3 from her t-1 firm / industry / county
Local labor market size	Measured by the number of establishments in each industry (SIC2)-county cell
National labor market size	Measured by the number of establishments in each industry (SIC2)
Local population	Population counts in a given county-year
Local unemployment rate	County-year level unemployment rate obtained from the Bureau of Labor Statistics.
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
TFP	Total factor productivity scaled by it within-industry standard deviation
Margin	[Total value of shipments (TVS) – labor costs – material costs] / TVS
Labor productivity	Total output divided by total labor hours
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 model



where 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

$W_2 - L_2 = W_1 - L_1$

$\Rightarrow$

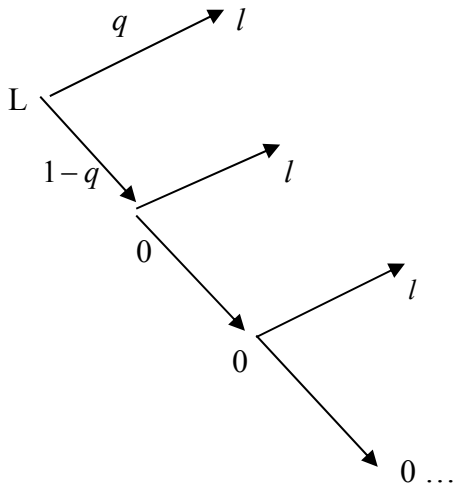
Wage premium=$W_2 - W_1 = \frac{q_2 l}{(1+r_f)} - \frac{q_1 l}{(1+r_f)} = \frac{(q_2 - q_1)}{(1+r_f)} l$

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

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

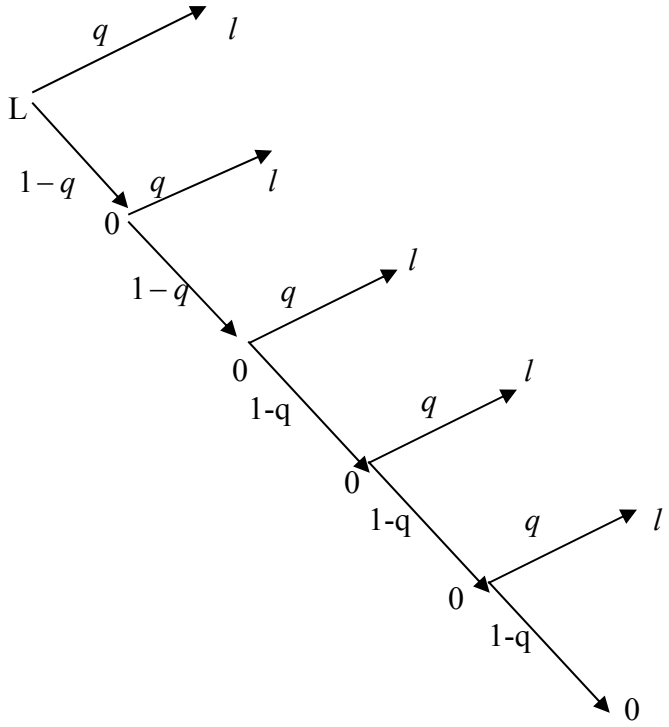
$$W_{BBB} - W_{AAA} = \left(\frac{q_{BBB}}{q_{BBB} + r_f} - \frac{q_{AAA}}{q_{AAA} + r_f}\right) l$$

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
Summary Statistics on Bankruptcy Events and Firm Characteristics

This table provides summary statistics on the events of corporate bankruptcy fillings 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 LEHD-Business Register Bridge, which is used to link the LEHD data to other Census and non-Census datasets. Panel B shows the summary statistics of the characteristics of sample bankrupt firms compared to all the bankrupt firms in the LoPucki database. Panel C shows the summary statistics of the characteristics of sample bankrupt firms compared to the propensity-score matched LEHD control firms. In Panels B and C, the statistics are based on values for the latest fiscal year before bankruptcy (usually year t-1 or t-2, where "year t" is the year of bankruptcy filings). 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. Detailed definitions of all the variables are reported in Appendix A. 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	Num. 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 Sample 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
M2B	1.18	1.01	1.14	0.86
N. emp. (Compustat)	10,766	21,487	8,584	19,869
N. emp. (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				
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 number of events	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
M2B	1.18	1.01	1.15	0.71	0.04
Log(wage per worker) ($)	10.39	0.56	10.45	0.54	-0.66
No. firm-level observations	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 ($m)	1448	1593	1772	1932	2284
Book assets ($m)	1176	1316	1426	1450	1411
Market assets ($m)	1176	1366	1529	1689	1745
Market equity ($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
M2B	1.71	2.48	1.60	1.29	1.13
N. emp. (000, CS)	11135	11923	12745	13075	12110
N. emp. (000, LBD)	12506	12438	13134	12819	11605
Wage / Assets	0.60	0.41	0.36	0.27	0.34
Wage per worker ($)	36269	42284	39667	39437	39395
No. of firm level observations	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, one year prior to the bankruptcy filing. 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 in the year before the bankruptcy filing (i.e., 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 CPI-adjusted based on year 2001 constant dollar. 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**		**Tstat for (3)-(1)**	**Tstat 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**
Wage (t-1) in 2001 dollar	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 the firm	23.59	42.45	40.39	49.07	39.89	48.97	2.66***	4.28***
% stay in the industry	39.11	48.80	48.81	49.99	50.83	49.99	1.87*	5.45***
% stay in the 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***
Total # employees	453,000	-	1,734,000	-	523,000	-	-	-
Number 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. Panel A use employees of the matched firms, and Panel B uses a 1% random sample of workers from the LEHD universe as the control group. The dependent variable is log(wage) in 2001 constant dollar. BR is an indicator variable equal to one for employees in bankrupt firms. The event year indicator variables are D[j], where j = -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. Detailed definitions of all the 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	.024	.003	.004	-.002	.027	-.002	-.010
	(1.11)	(.17)	(.19)	(-.09)	(1.53)	(-.09)	(-.56)
D[-3]×BR	.075	.028	.029	.000	.052	.000	-.010
	(1.16)	(.58)	(.60)	(.01)	(1.05)	(-.01)	(-.52)
D[-2]×BR	.083	.006	.007	.005	.063	.004	-.012
	(1.10)	(.11)	(.13)	(.14)	(.95)	(.10)	(-.38)
D[-1]×BR	.060	-.015	-.014	-.015	.063	-.002	-.012
	(.75)	(-.25)	(-.23)	(-.33)	(.83)	(-.04)	(-.34)
D[0]×BR	-.034	-.075*	-.074*	-.072**	-.049	-.078***	-.073***
	(-.59)	(-1.77)	(-1.75)	(-2.57)	(-1.02)	(-3.12)	(-3.64)
D[1]×BR	-.125**	-.127**	-.126**	-.137***	-.127***	-.140***	-.115***
	(-2.06)	(-2.50)	(-2.47)	(-4.10)	(-2.79)	(-4.96)	(-4.75)
D[2]×BR	-.159**	-.133**	-.132**	-.154***	-.141***	-.132***	-.096***
	(-2.49)	(-2.40)	(-2.38)	(-3.68)	(-2.92)	(-3.84)	(-3.28)
D[3]×BR	-.129**	-.085*	-.084*	-.102***	-.121***	-.100***	-.071***
	(-2.35)	(-1.83)	(-1.81)	(-3.04)	(-2.66)	(-3.29)	(-3.01)
D[4]×BR	-.210***	-.140**	-.138**	-.144***	-.165***	-.105***	-.065***
	(-3.12)	(-2.30)	(-2.27)	(-2.70)	(-3.91)	(-3.57)	(-2.99)
D[5]×BR	-.167**	-.086	-.084	-.067*	-.134**	-.048*	-.030
	(-2.09)	(-1.27)	(-1.24)	(-1.81)	(-2.39)	(-1.69)	(-1.33)
D[6]×BR	-.219**	-.111	-.109	-.085	-.163***	-.043	-.018
	(-2.37)	(-1.39)	(-1.37)	(-1.60)	(-2.71)	(-1.64)	(-.89)
D[-4]	.075***	.057***	.057***	.062***	.079***	.063***	.054***
	(4.93)	(4.40)	(4.29)	(9.77)	(8.06)	(10.56)	(10.73)
D[-3]	.184***	.147***	.145***	.154***	.185***	.153***	.133***
	(7.57)	(7.93)	(7.79)	(14.41)	(9.55)	(16.25)	(19.43)
D[-2]	.324***	.265***	.262***	.266***	.329***	.269***	.229***
	(8.01)	(9.32)	(9.25)	(10.30)	(7.94)	(9.61)	(10.73)
D[-1]	.267***	.212***	.209***	.202***	.257***	.193***	.151***
	(5.10)	(5.27)	(5.21)	(5.62)	(4.95)	(5.35)	(5.18)

D[0]	.172***	.137***	.134***	.129***	.174***	.125***	.093***
	(4.45)	(4.33)	(4.22)	(5.58)	(5.14)	(5.60)	(5.65)
D[1]	.127***	.103***	.100***	.095***	.128***	.093***	.071***
	(3.44)	(3.25)	(3.17)	(4.29)	(4.15)	(4.29)	(3.92)
D[2]	.109***	.093***	.091***	.086***	.116***	.085***	.065***
	(3.20)	(3.14)	(3.08)	(3.47)	(3.74)	(3.55)	(3.35)
D[3]	.095***	.086***	.084***	.074***	.103***	.073***	.054***
	(2.93)	(2.95)	(2.91)	(2.73)	(3.28)	(2.93)	(2.65)
D[4]	.091***	.085***	.084***	.072**	.098***	.066**	.049**
	(2.67)	(2.71)	(2.69)	(2.40)	(3.17)	(2.45)	(2.21)
D[5]	.061	.057	.056	.043	.073**	.039	.027
	(1.54)	(1.56)	(1.56)	(1.25)	(2.00)	(1.34)	(1.14)
D[6]	.076**	.072**	.072**	.031	.081**	.029	.018
	(1.97)	(2.02)	(2.03)	(.98)	(2.41)	(.99)	(.76)
Experience	-.262***	-.211***	-.211***	-.188***	-.248***	-.185***	-.173***
	(-20.56)	(-23.16)	(-22.91)	(-28.28)	(-26.86)	(-29.66)	(-32.28)
Female×Experience	.007***	.006***	.006***	.001	.005***	.001	.001
	(3.84)	(3.37)	(3.41)	(.60)	(2.77)	(.79)	(.82)
Experience×Educ	-.008***	-.007***	-.007***	-.007***	-.008***	-.006***	-.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				
Industry (SIC2) FE		Y	Y				
County FE			Y				
SIC2×Year FE				Y		Y	
County×Year FE					Y	Y	
County×SIC2×Year FE							Y
PV (Wage loss) % of annual wage	-80.5%	-61.9%	-61.2%	-62.6%	-71.5%	-54.4%	-40.4%
# worker-year obs.	19,223,000	19,223,000	19,223,000	19,223,000	19,223,000	19,223,000	19,223,000
R-squared	60.00%	63.03%	63.09%	63.51%	61.52%	64.47%	68.17%

Panel B: Randomly Selected Workers as Control Group

Dep. Var. = Log(wage)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
D[-4]×BR	-.039	-.054**	-.029**	-.025	-.027**	-.033***	-.033***
	(-1.30)	(-2.31)	(-2.43)	(-1.10)	(-2.57)	(-4.62)	(-4.62)
D[-3]×BR	.013	-.029	-.021	.003	-.024	-.036**	-.036**
	(.19)	(-.63)	(-1.09)	(.06)	(-1.22)	(-2.09)	(-2.09)
D[-2]×BR	.010	-.070	-.028	.022	-.018	-.016	-.016
	(.13)	(-1.26)	(-.85)	(.33)	(-.52)	(-.40)	(-.40)
D[-1]×BR	-.035	-.118**	-.066*	-.014	-.052	-.049	-.049
	(-.46)	(-1.99)	(-1.74)	(-.22)	(-1.28)	(-1.17)	(-1.17)
D[0]×BR	-.135**	-.186***	-.158***	-.121**	-.159***	-.167***	-.167***
	(-2.16)	(-3.80)	(-5.71)	(-2.45)	(-6.11)	(-7.71)	(-7.71)
D[1]×BR	-.226***	-.243***	-.221***	-.194***	-.211***	-.188***	-.188***
	(-3.59)	(-4.69)	(-8.89)	(-4.27)	(-9.55)	(-10.44)	(-10.44)
D[2]×BR	-.246***	-.235***	-.233***	-.189***	-.196***	-.167***	-.167***
	(-3.79)	(-4.37)	(-8.39)	(-4.04)	(-7.65)	(-7.71)	(-7.71)
D[3]×BR	-.202***	-.178***	-.165***	-.146***	-.144***	-.107***	-.107***
	(-3.20)	(-3.30)	(-5.73)	(-2.94)	(-4.89)	(-4.38)	(-4.38)
D[4]×BR	-.265***	-.212***	-.178***	-.167***	-.132***	-.081***	-.081***
	(-3.43)	(-3.01)	(-5.18)	(-3.40)	(-4.31)	(-3.03)	(-3.03)
D[5]×BR	-.223***	-.165**	-.108***	-.136**	-.079**	-.035	-.035
	(-2.61)	(-2.12)	(-3.33)	(-2.24)	(-2.44)	(-1.25)	(-1.25)
D[6]×BR	-.238**	-.150	-.113***	-.132**	-.064*	-.018	-.018
	(-2.35)	(-1.64)	(-2.77)	(-1.99)	(-1.83)	(-.58)	(-.58)
D[-4]	.123***	.102***	.091***	.115***	.088***	.078***	.078***
	(12.87)	(12.34)	(18.53)	(16.46)	(18.68)	(17.13)	(17.13)
D[-3]	.234***	.194***	.177***	.221***	.172***	.155***	.155***
	(14.20)	(13.58)	(21.61)	(18.98)	(21.96)	(20.28)	(20.28)
D[-2]	.391***	.332***	.308***	.372***	.300***	.271***	.271***
	(15.88)	(15.41)	(24.93)	(21.31)	(25.10)	(23.40)	(23.40)
D[-1]	.366***	.306***	.279***	.333***	.260***	.231***	.231***
	(12.18)	(11.62)	(19.63)	(16.36)	(18.96)	(17.36)	(17.36)
D[0]	.284***	.234***	.207***	.259***	.196***	.172***	.172***
	(8.11)	(7.67)	(13.29)	(11.35)	(13.13)	(11.84)	(11.84)
D[1]	.238***	.196***	.167***	.213***	.157***	.136***	.136***
	(5.70)	(5.37)	(9.25)	(8.05)	(9.22)	(8.20)	(8.20)
D[2]	.207***	.172***	.140***	.180***	.129***	.108***	.108***
	(4.32)	(4.11)	(6.90)	(5.96)	(6.77)	(5.82)	(5.82)
D[3]	.184***	.159***	.124***	.152***	.110***	.088***	.088***
	(3.25)	(3.22)	(5.37)	(4.50)	(5.15)	(4.27)	(4.27)
D[4]	.165***	.147***	.106***	.130***	.091***	.067***	.067***
	(2.59)	(2.64)	(4.16)	(3.43)	(3.85)	(2.95)	(2.95)

D[5]	.147**	.137**	.090***	.113***	.077***	.052**	.052**
	(2.10)	(2.22)	(3.24)	(2.69)	(2.96)	(2.09)	(2.09)
D[6]	.134*	.132*	.080***	.097**	.065**	.040	.040
	(1.71)	(1.92)	(2.62)	(2.12)	(2.32)	(1.48)	(1.48)
Experience	-.262***	-.206***	-.189***	-.248***	-.183***	-.173***	-.173***
	(-24.05)	(-26.86)	(-34.74)	(-28.28)	(-35.86)	(-34.39)	(-34.39)
Female×Experience	.004*	.004**	-.001	.003*	-.001	-.002	-.002
	(1.75)	(2.04)	(-.77)	(1.90)	(-.87)	(-1.64)	(-1.64)
Experience×Educ	-.008***	-.007***	-.006***	-.008	-.006***	-.006***	-.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				
Industry (SIC2) FE		Y	Y				
County FE			Y				
SIC2×Year FE				Y		Y	
County×Year FE					Y	Y	
County×SIC2×Year FE							Y
PV (Wage loss) % of annual wage	-118.2%	-108.6%	-94.9%	-87.3%	-81.3%	-64.8%	-64.8%
# worker-year obs.	8,320,000	8,320,000	8,320,000	8,320,000	8,320,000	8,320,000	8,320,000
R-squared	58.63%	62.49%	62.89%	60.35%	63.97%	68.42%	68.42%

Table 4
Conditional Analysis by Workers' Displacement Status

This table presents the regression results conditional on workers' displacement status. 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×Educ). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollar. Detailed definitions of all the 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 & LeaveCount y = 0	(4) LeaveInd =1 & LeaveCount y = 0	(5) LeaveInd = 0 & LeaveCount y = 1	(6) LeaveInd = 1 & LeaveCount y = 1	(7) LeaveFirm = 0
D[-4]×BR	-.043**	-.032**	.017	-.046**	.012	-.044***	-.044**
	(-2.00)	(-2.05)	(.76)	(-2.52)	(.58)	(-2.82)	(-2.06)
D[-3]×BR	-.073**	-.025	.004	-.055***	.049*	-.033	-.072**
	(-2.12)	(-1.06)	(.13)	(-2.58)	(1.83)	(-1.16)	(-2.18)
D[-2]×BR	-.089*	-.022	.013	-.055	.070	-.035	-.089*
	(-1.90)	(-.57)	(.31)	(-1.43)	(1.62)	(-.78)	(-1.90)
D[-1]×BR	.039	-.085	.079	-.104**	.123**	-.139**	.038
	(.61)	(-1.57)	(1.43)	(-2.12)	(2.42)	(-2.45)	(.60)
D[0]×BR	.090	-.184***	.063	-.191***	.039	-.265***	.089
	(1.58)	(-4.90)	(1.54)	(-5.97)	(.93)	(-6.83)	(1.59)
D[1]×BR	.129	-.305***	.001	-.250***	-.030	-.436***	.130*
	(1.62)	(-7.08)	(.02)	(-8.08)	(-.73)	(-9.02)	(1.66)
D[2]×BR	.131	-.339***	-.073	-.245***	.041	-.535***	.135
	(1.16)	(-6.76)	(-1.02)	(-6.25)	(.89)	(-8.55)	(1.21)
D[3]×BR	-.025	-.188***	.035	-.220***	.034	-.289***	-.021
	(-.41)	(-5.95)	(.84)	(-8.10)	(.96)	(-8.59)	(-.33)
D[4]×BR	-.199*	-.162***	-.031	-.162***	.013	-.226***	-.200*
	(-1.69)	(-4.78)	(-.69)	(-5.77)	(.29)	(-6.44)	(-1.69)
D[5]×BR	-.155**	-.072*	.080	-.085***	.132**	-.147***	-.154**
	(-2.41)	(-1.88)	(1.43)	(-2.77)	(1.99)	(-3.85)	(-2.38)
D[6]×BR	-.269**	-.058*	.091**	-.067**	.118**	-.120***	-.270**
	(-1.99)	(-1.71)	(2.01)	(-2.50)	(2.13)	(-3.53)	(-1.99)
Control for D[-4] to D[6]	Y	-	Y	-	-	-	-
Control for employee characteristics	Y	-	Y	-	-	-	-
BR	0.029	-	0.028	-	-	-	-
	(.44)	-	(0.44)	-	-	-	-
BR×Dummy	.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	-	-	-	-
# worker-year obs.	19,223,000	-	19,223,000	-	-	-	-
R-squared	63.59%	-	63.63%	-	-	-	-

Table 5
Conditional Analysis by Re-employability of Workers in Labor Markets

This table presents the regression results by labor market conditions. Each conditional variable is used to separate the sample into two groups by the median values. The variable "Dummy(second group)" is equal to one if the conditional variable represents "better" labor market conditions. The regressions include event year indicators (D[-4], …, D[6]) and employee characteristics (Experience, Female×Experience, Experience×Educ). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollar. Detailed definitions of all the 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: Size of Labor Market

Dep. Var. = Log(wage)	(1) Small local labor market	(2) Large local labor market	(3) Small national labor market	(4) Large national labor market	(5) Small local population	(6) Large local population
D[-4]×BR	-.041**	-.025	-.066***	-.004	-.034*	-.031**
	(-2.05)	(-1.48)	(-2.94)	(-.20)	(-1.66)	(-2.12)
D[-3]×BR	-.048**	-.022	-.087***	.021	-.018	-.057**
	(-1.96)	(-.76)	(-3.24)	(.88)	(-.95)	(-2.15)
D[-2]×BR	-.037	-.020	-.082*	.021	-.012	-.059
	(-.86)	(-.46)	(-1.75)	(.51)	(-.30)	(-1.28)
D[-1]×BR	-.074	-.006	-.108	.006	-.037	-.073
	(-1.32)	(-.11)	(-1.58)	(.12)	(-.85)	(-1.05)
D[0]×BR	-.132***	-.068	-.156***	-.064**	-.101***	-.117**
	(-3.59)	(-1.63)	(-2.70)	(-1.97)	(-4.02)	(-2.29)
D[1]×BR	-.188***	-.151***	-.194***	-.146***	-.170***	-.186***
	(-4.15)	(-4.41)	(-3.06)	(-4.17)	(-5.73)	(-3.67)
D[2]×BR	-.235***	-.123***	-.284***	-.109***	-.211***	-.168***
	(-3.99)	(-3.91)	(-3.74)	(-2.78)	(-5.04)	(-3.12)
D[3]×BR	-.165***	-.095***	-.165**	-.103***	-.143***	-.137***
	(-3.59)	(-3.05)	(-2.46)	(-3.73)	(-4.74)	(-2.70)
D[4]×BR	-.233***	-.106***	-.259**	-.116***	-.180***	-.186**
	(-2.95)	(-3.10)	(-2.08)	(-3.98)	(-5.42)	(-1.96)
D[5]×BR	-.150***	-.034	-.161*	-.052**	-.099***	-.111*
	(-3.05)	(-.83)	(-1.95)	(-1.97)	(-3.16)	(-1.81)
D[6]×BR	-.181**	-.042	-.193	-.063***	-.120***	-.129
	(-2.04)	(-1.24)	(-1.34)	(-2.59)	(-3.50)	(-1.25)
Control for D[-4] to D[6]	Y	-	Y	-	Y	-
Control for employee characteristics	Y	-	Y	-	Y	-
BR	.159***	-	.066	-	.089***	-
	(3.51)	-	(1.07)	-	(3.45)	-
Dummy (second group)	.028*	-	.029	-	.014	-
	(1.67)	-	(.74)	-	(1.20)	-
BR×Dummy (second group)	-.103**	-	-.043	-	.030	-
	(-2.17)	-	(-.70)	-	(.94)	-
Worker FE	Y	-	Y	-	Y	-
SIC2×Year FE	Y	-	Y	-	Y	-
No. worker-year obs.	19,223,000	-	19,223,000	-	19,223,000	-
R-squared	63.52%	-	63.55%	-	63.52%	-

Panel B: Local Unemployment Rate

Dep. Var. = Log(wage)	(1) High local unemployment rate	(2) Low local unemployment rate
D[-4]×BR	-.039**	-.026
	(-2.42)	(-1.19)
D[-3]×BR	-.056**	-.017
	(-2.25)	(-.80)
D[-2]×BR	-.048	-.020
	(-.96)	(-.55)
D[-1]×BR	-.080	-.036
	(-1.22)	(-.74)
D[0]×BR	-.142***	-.090***
	(-2.90)	(-3.02)
D[1]×BR	-.186***	-.173***
	(-4.23)	(-4.96)
D[2]×BR	-.232***	-.172***
	(-4.16)	(-4.65)
D[3]×BR	-.151***	-.138***
	(-3.18)	(-4.29)
D[4]×BR	-.230**	-.155***
	(-2.48)	(-3.97)
D[5]×BR	-.133**	-.091***
	(-2.04)	(-2.82)
D[6]×BR	-.082	-.139**
	(-1.51)	(-2.27)
Control for D[-4] to D[6]	Y	
Control for employee characteristics	Y	
BR	.095**	-
	(2.43)	-
Dummy (second group)	-.019	-
	(-1.43)	-
BR×Dummy (second group)	.002	-
	(.09)	-
Worker FE	Y	-
SIC2×Year FE	Y	-
No. worker-year obs.	19,223,000	-
R-squared	63.52%	-

Table 6
Conditional Analysis by Worker and Firm Characteristics

This table presents the regression results by worker and firm characteristics. Each continuous conditional variable is used to separate the sample into two groups by the median values except tenure for which groups are formed at 6 years of tenure. The variable "Dummy(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×Educ). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollar. Detailed definitions of all the 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: Worker Characteristics

Dep. Var. = Log(wage)	(1) Young workers	(2) Old workers	(3) Low tenure	(4) High tenure	(5) Low union coverage	(6) High union coverage
D[-4]×BR	-.039***	-.038*	-.044*	-.049**	-0.035	-0.02
	(-2.58)	(-1.94)	(-1.85)	(-2.29)	(-1.42)	(-1.15)
D[-3]×BR	-.047**	-0.031	-0.039	-0.031	-0.024	-0.025
	(-2.54)	(-1.46)	(-1.28)	(-1.09)	(-1.07)	(-.80)
D[-2]×BR	-0.046	-0.02	-0.042	-0.019	0.024	-0.055
	(-1.12)	(-.62)	(-1.43)	(-.44)	-0.38	(-1.07)
D[-1]×BR	-0.033	-.076*	-0.051	-0.066	0.037	-.117*
	(-.60)	(-1.69)	(-1.32)	(-.98)	-0.57	(-1.71)
D[0]×BR	-.086**	-.141***	-.112***	-.119**	-0.035	-.166***
	(-2.41)	(-4.38)	(-3.66)	(-2.18)	(-1.08)	(-3.61)
D[1]×BR	-.150***	-.209***	-.180***	-.197***	-.104***	-.225***
	(-4.25)	(-5.41)	(-6.25)	(-3.27)	(-4.01)	(-4.45)
D[2]×BR	-.142***	-.240***	-.197***	-.222***	-.117***	-.238***
	(-4.20)	(-5.02)	(-6.42)	(-3.39)	(-3.78)	(-3.74)
D[3]×BR	-.105***	-.176***	-.140***	-.173***	-0.034	-.211***
	(-3.29)	(-4.31)	(-5.01)	(-2.84)	(-1.46)	(-3.90)
D[4]×BR	-.119***	-.232***	-.158***	-.299**	-0.027	-.293***
	(-3.17)	(-3.49)	(-5.28)	(-2.47)	(-1.01)	(-3.19)
D[5]×BR	-.090***	-.127***	-.109***	-.136*	-0.006	-.180**
	(-2.64)	(-2.80)	(-3.54)	(-1.90)	(-.23)	(-2.57)
D[6]×BR	-0.05	-.167**	-.093***	-.277*	0.019	-.225**
	(-1.46)	(-2.45)	(-2.79)	(-1.81)	-0.54	(-2.37)
Control for D[-4] to D[6]	Y	-	Y	-	Y	-
Control for employee characteristics	Y	-	Y	-	Y	-
BR	.093**	-	.106***	-	.039**	-
	-2.5	-	-4.38	-	-2.12	-
Dummy (second group)	.227***	-	.442***	-	0.028	-
	-10.69	-	-17	-	-1.09	-
BR×Dummy (second group)	.064*	-	0.009	-	.120**	-
	-1.95	-	-0.21	-	-2.28	-
Worker FE	Y	-	Y	-	Y	-
SIC2×Year FE	Y	-	Y	-	Y	-
No. worker-year obs.	19,223,000	-	19,223,000	-	19,223,000	-
R-squared	63.80%	-	64.00%	-	63.53%	-

Panel B: Firm Characteristics

Dep. Var. = Log(wage)	(1) Small firm size	(2) Large firm size	(3) Young firms	(4) Old firms
D[-4]×BR	-.027*	-.075***	-.027	-.041*
	(-1.77)	(-3.22)	(-1.23)	(-1.68)
D[-3]×BR	-.064**	-.013	-.007	-.065**
	(-2.36)	(-.39)	(-.31)	(-2.51)
D[-2]×BR	-.058	-.031	-.030	-.027
	(-1.24)	(-.56)	(-.81)	(-.43)
D[-1]×BR	-.104*	-.017	-.062	-.046
	(-1.75)	(-.29)	(-1.42)	(-.54)
D[0]×BR	-.149***	-.053	-.121***	-.090
	(-3.73)	(-1.34)	(-4.42)	(-1.45)
D[1]×BR	-.222***	-.085***	-.175***	-.170***
	(-5.66)	(-3.08)	(-5.68)	(-2.80)
D[2]×BR	-.248***	-.080**	-.189***	-.196***
	(-5.59)	(-1.98)	(-5.39)	(-2.76)
D[3]×BR	-.177***	-.073***	-.138***	-.138**
	(-4.47)	(-2.63)	(-5.26)	(-2.16)
D[4]×BR	-.245***	-.083***	-.142***	-.235**
	(-3.18)	(-2.95)	(-5.36)	(-2.02)
D[5]×BR	-.120***	-.073**	-.084***	-.133*
	(-2.66)	(-2.01)	(-2.90)	(-1.72)
D[6]×BR	-.173**	-.050	-.080***	-.214
	(-2.07)	(-1.24)	(-3.03)	(-1.49)
Control for D[-4] to D[6]	Y	-	Y	-
Control for employee characteristics	Y	-	Y	-
BR	.140***	-	.096***	-
	(3.41)	-	(3.87)	-
Dummy (second group)	.015	-	.005	-
	(.76)	-	(.22)	-
BR×Dummy (second group)	-.089**	-	-.013	-
	(-1.99)	-	(-.26)	-
Worker FE	Y	-	Y	-
SIC2×Year FE	Y	-	Y	-
No. worker-year obs.	19,223,000	-	19,223,000	-
R-squared	63.53%	-	63.52%	-

Table 7
Conditional Analysis by Outcomes of Chapter 11 Bankruptcy

This table presents the regression results by different bankruptcy outcomes. "Good outcomes" include the bankruptcy cases in which the firm is merged, acquired, or continues. "Bad outcomes" include cases in which the firm is liquidated, closed down, or refiles Chapter 11. The regressions include event year indicators (D[-4], …, D[6]) and employee characteristics (Experience, Female×Experience, Experience×Educ). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollar. Detailed definitions of all the 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) Emergence	(2) Non-emergence	(3) Good outcomes	(4) Bad outcomes	(5) Liquidation	(6) Non-liquidation
D[-4]×BR	-.036*	-.029	-.050**	-.018	-.046	-.033**
	(-1.65)	(-1.56)	(-1.97)	(-1.28)	(-1.48)	(-1.97)
D[-3]×BR	-.034*	-.045	-.033	-.036	-.072	-.033
	(-1.70)	(-1.37)	(-1.55)	(-1.25)	(-1.56)	(-1.50)
D[-2]×BR	-.009	-.073	-.017	-.040	-.145*	-.022
	(-.22)	(-1.23)	(-.36)	(-.78)	(-1.73)	(-.50)
D[-1]×BR	-.023	-.101	-.010	-.080	-.145	-.043
	(-.49)	(-1.30)	(-.19)	(-1.13)	(-1.43)	(-.77)
D[0]×BR	-.104***	-.123**	-.094***	-.121**	-.190**	-.102***
	(-3.74)	(-2.11)	(-3.55)	(-2.45)	(-2.06)	(-2.84)
D[1]×BR	-.147***	-.224***	-.116***	-.217***	-.241**	-.169***
	(-4.80)	(-4.12)	(-4.89)	(-4.52)	(-2.56)	(-4.53)
D[2]×BR	-.163***	-.240***	-.134***	-.233***	-.220***	-.189***
	(-5.16)	(-3.26)	(-5.19)	(-3.86)	(-3.51)	(-4.21)
D[3]×BR	-.138***	-.147***	-.102***	-.168***	-.065	-.144***
	(-4.06)	(-2.92)	(-4.05)	(-3.22)	(-1.46)	(-3.67)
D[4]×BR	-.165***	-.210**	-.125***	-.223**	-.024	-.190***
	(-4.08)	(-2.24)	(-4.71)	(-2.50)	(-.56)	(-3.07)
D[5]×BR	-.104***	-.106*	-.064**	-.139**	.012	-.110**
	(-2.79)	(-1.90)	(-2.10)	(-2.32)	(.26)	(-2.47)
D[6]×BR	-.147**	-.091*	-.044	-.187*	.086*	-.134**
	(-2.01)	(-1.86)	(-1.35)	(-1.94)	(1.85)	(-2.09)
Control for D[-4] to D[6]	Y	-	Y	-	Y	-
Control for employee characteristics	Y	-	Y	-	Y	-
BR	.133***	.127**	.102***	.129**	.070**	.103***
	(4.47)	(2.55)	(2.84)	(2.56)	(2.03)	(2.76)
Worker FE	Y	-	Y	-	Y	-
SIC2×Year FE	Y	-	Y	-	Y	-
No. worker-year obs.	19,223,000	-	19,223,000	-	19,223,000	-
R-squared	63.51%	-	63.52%	-	63.52%	-

Table 8
Bankruptcy, Productivity, and Labor Outcomes

This table presents the regression results using manufacturing plant-level data from the Census Bureau's ASM and CMF databases. The regressions include 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 dollar. Detailed definitions of all the 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) TFP	(2) Margin	(3) Labor productivity	(4) Log (avg. wage)	(5) Log (wage per hour)	(6) Log (benefits)	(7) Working hours per worker
D[-4]×BR	0.055	0.010	0.080	0.008	0.068	0.041	-0.056***
	(0.60)	(0.49)	(0.85)	(0.23)	(1.63)	(0.66)	(-2.86)
D[-3]×BR	0.056	-0.002	0.051	0.005	0.056	0.001	-0.049**
	(0.67)	(-0.12)	(0.51)	(0.18)	(1.59)	(0.01)	(-2.24)
D[-2]×BR	-0.027	-0.005	-0.001	-0.033	0.011	-0.028	-0.040**
	(-0.30)	(-0.24)	(-0.01)	(-1.02)	(0.31)	(-0.45)	(-2.11)
D[-1]×BR	-0.005	0.003	-0.025	-0.055*	0.001	-0.031	-0.051**
	(-0.05)	(0.16)	(-0.26)	(-1.84)	(0.03)	(-0.52)	(-2.50)
D[0]×BR	-0.071	-0.019	-0.019	-0.072**	-0.005	-0.025	-0.065***
	(-0.69)	(-0.85)	(-0.19)	(-2.52)	(-0.14)	(-0.43)	(-2.82)
D[1]×BR	-0.063	-0.052**	-0.034	-0.068**	0.007	-0.080*	-0.072***
	(-0.54)	(-2.07)	(-0.41)	(-2.39)	(0.25)	(-1.69)	(-3.10)
D[2]×BR	0.027	-0.030	0.035	-0.064**	0.035	-0.098*	-0.097***
	(0.20)	(-1.11)	(0.34)	(-2.05)	(0.93)	(-1.94)	(-3.74)
D[3]×BR	0.130	0.022	0.045	-0.088***	0.037	-0.088	-0.126***
	(0.92)	(0.80)	(0.40)	(-2.61)	(0.89)	(-1.28)	(-4.09)
D[4]×BR	0.185	0.028	-0.011	-0.063	0.041	-0.114*	-0.098***
	(1.10)	(0.74)	(-0.09)	(-1.40)	(0.87)	(-1.69)	(-3.13)
D[5]×BR	0.017	-0.039	-0.049	-0.033	0.049	-0.098	-0.078**
	(0.11)	(-1.46)	(-0.35)	(-0.71)	(1.03)	(-0.96)	(-2.50)
D[6]×BR	0.174	0.027	0.042	-0.007	0.049	0.032	-0.046
	(1.59)	(0.83)	(0.30)	(-0.13)	(0.91)	(0.30)	(-1.20)
Control for D[-4] to D[6]	Y	Y	Y	Y	Y	Y	Y
Log (# plants per segment)	0.012	0.003	0.056***	-0.014***	0.000	-0.007	-0.014***
	(1.30)	(1.10)	(6.65)	(-4.46)	(0.15)	(-1.52)	(-7.00)
Log (# plants per firm)	0.061***	0.006***	0.093***	0.024***	0.031***	0.074***	-0.007***
	(10.31)	(3.20)	(17.83)	(8.87)	(10.20)	(18.64)	(-5.55)
Plant age (/100)	-0.578***	-0.033***	-0.154***	0.544***	0.461***	0.835***	0.087***
	(-15.54)	(-3.59)	(-4.57)	(35.42)	(28.19)	(42.11)	(8.86)
Industry-year FE	Y	Y	Y	Y	Y	Y	Y
Bankruptcy event FE	Y	Y	Y	Y	Y	Y	Y
No. obs.	775,000	775,000	775,000	775,000	775,000	775,000	775,000
R-squared	1.41%	17.56%	45.71%	29.16%	25.77%	65.83%	5.15%

Table 9
Analysis of Private Firms' Bankruptcy

This table presents the results using private bankrupt firms New Generation Research's bankruptcydata.com. Panel A shows the sample selection process for the private bankrupt firms. These firms are matched with private firms in the same industry, year with similar size, age, and average wages. The regressions in Panel B are based on employees of the private bankrupt firms and the matched firms. The regressions include event year indicators (D[-4], …, D[6]) and employee characteristics (Experience, Female×Experience, Experience×Educ). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollar. 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: Event Sample Selection of Private Bankrupt Firms (1999-2002)

Year	Num. Events
All Bankruptcy Cases from the Bankruptcy.com Database excluding finance and utilities sector	235
Matched with LEHD data & matched with non-bankruptcy firms	50

Panel B: Regression Results Using Private Bankrupt and Matched Control Firms

Dep. Var. = Log (wage)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
D[-4]×BR	-.059	-.048	-.047	-.060**	.050	.010	.006
	(-1.29)	(-1.16)	(-1.13)	(-2.06)	(1.50)	(.31)	(.17)
D[-3]×BR	-.056	-.027	-.024	-.126**	-.076*	-.121***	-.129***
	(-.72)	(-.35)	(-.31)	(-2.54)	(-1.71)	(-2.68)	(-2.94)
D[-2]×BR	-.121	-.052	-.050	-.022	.040	.128	-.080
	(-1.24)	(-.54)	(-.52)	(-.20)	(.43)	(.95)	(-.50)
D[-1]×BR	-.201**	-.134	-.132	-.184**	-.052	-.085	-.203*
	(-2.54)	(-1.62)	(-1.61)	(-2.04)	(-.72)	(-1.03)	(-1.73)
D[0]×BR	-.647***	-.607***	-.604***	-.557***	-.478***	-.476***	-.542***
	(-7.62)	(-6.83)	(-6.77)	(-6.32)	(-6.55)	(-7.16)	(-5.66)
D[1]×BR	-.643***	-.601***	-.597***	-.568***	-.417***	-.412***	-.443***
	(-5.96)	(-5.22)	(-5.13)	(-4.15)	(-5.71)	(-5.51)	(-3.95)
D[2]×BR	-.467***	-.432***	-.429***	-.365***	-.211***	-.200***	-.239***
	(-6.44)	(-5.76)	(-5.56)	(-4.35)	(-3.45)	(-3.46)	(-3.48)
D[3]×BR	-.302***	-.290***	-.289***	-.224***	-.166***	-.155***	-.203***
	(-4.99)	(-5.10)	(-4.97)	(-3.17)	(-3.29)	(-3.05)	(-3.35)
D[4]×BR	-.366***	-.329***	-.326***	-.252***	-.145***	-.128***	-.199***
	(-5.64)	(-5.17)	(-5.03)	(-4.06)	(-3.05)	(-2.66)	(-3.57)
D[5]×BR	-.326***	-.296***	-.294***	-.205***	-.128***	-.110**	-.186***
	(-4.83)	(-4.03)	(-3.92)	(-2.76)	(-2.71)	(-2.31)	(-3.28)
D[6]×BR	-.438***	-.404***	-.403***	-.335***	-.093*	-.087*	-.141**
	(-3.55)	(-3.01)	(-2.95)	(-2.88)	(-1.87)	(-1.76)	(-2.49)
Control for D[-4] to D[6]	Y	Y	Y	Y	Y	Y	Y
Control for employee characteristics	Y	Y	Y	Y	Y	Y	Y
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
No. worker-year obs.	332,000	332,000	332,000	332,000	332,000	332,000	332,000
R2	61.22%	63.40%	63.58%	64.51%	65.46%	67.79%	76.84%

Table 10
Financial Distress Risk and Worker Wages

This table presents the relation between financial distress risk and employee wages. Panel A shows the average effect and Panels B-C show analysis by various firm characteristics (subsampled by median values). Panel B sorts firms by their credit ratings at 'A-.' The regressions in Panels B-C include the same employee 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 dollar. 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

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)
M2B	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)
Educ	0.091***	0.091***	0.091***
	(25.40)	(25.41)	(25.50)
Exp	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×Educ	-0.001	-0.001	-0.001
	(-0.54)	(-0.53)	(-0.52)
Experience×Educ	-0.001***	-0.001***	-0.001***
	(-9.11)	(-9.12)	(-9.13)
County×SIC2×Year FE	Y	Y	Y
No. obs.	6,811,000	6,811,000	6,811,000
R2	34.65%	34.66%	34.66%

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)
M2B	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 employee characteristics	Y	-	Y	-	Y	-
County×SIC2×Year FE	Y	-	Y	-	Y	-
No. obs.	6,811,000	-	6,811,000	-	6,811,000	-
R2	34.71%	-	34.71%	-	34.77%	-

Panel C: High vs. Low Indep. Var

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)
M2B	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 employee characteristics	Y	-	Y	-	Y	-
County×SIC2×Year FE	Y	-	Y	-	Y	-
No. obs.	6,811,000	-	6,811,000	-	6,811,000	-
R2	34.68%	-	34.68%	-	34.69%	-

Panel D: High vs. Low Market-to-Book

Dep. Var. = Log (wage)	(1) Low M2B	(2) High M2B	(3) Low M2B	(4) High M2B	(5) Low M2B	(6) High M2B
Book leverage	0.251***	-0.194	-	-	-	-
	(2.91)	(-1.30)	-	-	-	-
Market leverage	-	-	0.287***	-0.162	-	-
	-	-	(2.78)	(-0.56)	-	-
Altman's Z-score	-	-	-	-	-0.030	-0.042
	-	-	-	-	(-1.30)	(-1.23)
Log book assets	0.046***	0.062***	0.045***	0.063***	0.045***	0.507**
	(4.20)	(6.36)	(4.13)	(6.34)	(4.01)	(2.49)
M2B	-0.009	0.021**	0.027	0.022**	-0.004	0.215*
	(-0.25)	(2.20)	(0.72)	(2.01)	(-0.11)	(1.89)
ROA	0.386*	0.000	0.401**	0.006	0.507**	0.000
	(1.93)	(0.00)	(2.00)	(0.03)	(2.49)	(0.00)
Tangibility	0.153	0.135	0.154	0.122	0.215*	0.054***
	(1.52)	(0.94)	(1.49)	(0.85)	(1.89)	(5.15)
Control for employee characteristics	Y	-	Y	-	Y	-
County×SIC2×Year FE	Y	-	Y	-	Y	-
No. obs.	6,811,000	-	6,811,000	-	6,811,000	-
R2	34.68%	-	34.67%	-	34.67%	-

Table 11
Back-of-the-Envelope Estimate of Present Value of Wage Losses in Bankruptcy

This table presents a back-of-the-envelope estimate of the present value of wage losses for workers employed by bankrupt firms (relative to market value of the firm's assets) based on the regression coefficients in Table 3, Panel A, Column 4. Present values are computed using a real discount rate of 5%. The values in items A, C, E1, and E2 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 t to t+6 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 dollar.

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 x C	PV of total wage loss for average firm	$252.75 m
E1	Average market value of assets in t-5	$1,176 m
E2	Average market value of assets in t-1	$1,745 m
F1 = D / E1	PV of total wage loss / market value of assets (t-5)	21.49%
F2 = D / E2	PV of total wage loss / market value of assets (t-1)	14.48%

Table 12
An Estimation of Ex-ante Wage Premium

Using the ex-post wage loss numbers in Table 5, 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 = $1-(1-0.11\times p_5)^{1/5}$ ($1-(1-0.11\times p_{10})^{1/10}$), where 0.11 is the probability of Chapter 11 conditional on default (from Agrawal and Matsa, 2013), 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 2-year and 5-year tenures (Columns 5 & 6) and $q_{10,1}$ for 10-year and infinite-year tenures (Columns 7 & 8). Denote the PV of total wage loss for average firm (802.46 million, item D from Table 6) as wl, and the average market value of sample firms ($2,754 million in t-1, from Table 1 Panel E) as A. Assume the risk free rate is 2.5% over our sample period. Then Column 7 = $q_{5,1}$/(1+risk free rate)×wl/A, and Column 11 = $q_{10,1}$/($q_{10,1}$+ risk free rate)×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	$q_{10,1}$ = One year risk adjusted bankruptcy probability based on p_{10}
(1)	(2)	(3)	(4)	(5)
AAA	0.54	1.65	0.01	0.02
AA	1.65	6.75	0.04	0.07
A	7.07	12.72	0.16	0.14
BBB	11.39	20.88	0.25	0.23
BB	21.07	39.16	0.47	0.44
B	34.90	62.48	0.78	0.71
BBB minus AAA	10.85	19.23	0.24	0.21

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

Credit ratings	Tax benefits of debt (from Table VI in AP	Wage premium (two period model)	Wage premium (5 year tenure)	Wage premium (10 year tenure)	Wage premium (infinite period model)
(1)	(2)	(3)	(4)	(5)	(6)
AAA	0.47	0.011	0.05	0.16	0.69
AA	2.51	0.03	0.16	0.64	2.59
A	4.40	0.15	0.71	1.20	4.46
BBB	5.18	0.24	1.14	1.97	6.55
BB	7.22	0.46	2.11	3.70	9.95
B	8.95	0.79	3.49	5.92	12.79
BBB minus AAA	4.71	0.233	1.08	1.81	5.86

Table 13
Results based on Imputed Wages

This table presents the regression results (same regression as in Table 3) based on imputed wages. In Columns (1) and (2), missing wages are imputed using zero. In Columns (3) and (4), missing wages are imputed using last available wages in the LEHD data. The regressions include event year indicators (D[-4], …, D[6]) and employee characteristics (Experience, Female×Experience, Experience×Educ). The coefficient estimates for these variables are suppressed for expositional convenience. All dollar amounts are in 2001 constant dollar. Detailed definitions of all the 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) Zero	(2) Zero	(3) Last avail.	(4) Last avail.
D[-4]×BR	.073	.065	.027	.016
	(1.12)	(1.40)	(.76)	(.53)
D[-3]×BR	.091	.088	.027	.020
	(1.06)	(1.32)	(.73)	(.53)
D[-2]×BR	.079	.069	.022	.010
	(.97)	(1.04)	(.53)	(.25)
D[-1]×BR	.068	.072	.012	.041
	(.70)	(.95)	(.21)	(.74)
D[0]×BR	-.141*	-.126**	-.035	-.018
	(-1.67)	(-2.31)	(-.73)	(-.42)
D[1]×BR	-.393***	-.237***	-.067	-.035
	(-4.87)	(-4.05)	(-1.31)	(-.72)
D[2]×BR	-.433***	-.263***	-.085	-.038
	(-4.78)	(-3.83)	(-1.45)	(-.75)
D[3]×BR	-.407***	-.225***	-.058	-.007
	(-3.78)	(-3.75)	(-1.11)	(-.18)
D[4]×BR	-.384***	-.163***	-.089	-.024
	(-2.78)	(-2.67)	(-1.49)	(-.64)
D[5]×BR	-.151	-.091	-.046	.033
	(-1.44)	(-1.42)	(-.78)	(1.27)
D[6]×BR	-.100	-.081	-.117	-.063
	(-.93)	(-1.19)	(-1.24)	(-1.01)
Control for D[-4] to D[6]	Y	Y	Y	Y
Control for employee characteristics	Y	Y	Y	Y
Worker FE	Y	Y	Y	Y
SIC2×Year FE	Y		Y	
County×SIC2×Year FE		Y		Y
No. worker-year obs.	25,105,000	25,105,000	25,105,000	25,105,000
R-squared	60.32%	67.70%	66.77%	69.87%

Figure 1
Changes in Wages 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 changes of wages for the employee of the matched firms. In the figure, 'year t' is the year of bankruptcy filing.