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Employer-Provided Benefit Plans, Workforce Composition and Firm Outcomes

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Prepared by : Anja Decressin, Julia Lane, Kristin McCue, Martha Stinson
Contact : U.S. Census Bureau, LEHD Program
FB 2138-3
4700 Silver Hill Rd.
Suitland, MD 20233 USA

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Anja Decressin**
Cornell University and
U.S. Census Bureau

Julia Lane
National Science Foundation and
U.S. Census Bureau

Kristin McCue
U.S. Census Bureau

Martha Stinson
U.S. Census Bureau

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** Corresponding author:
Anja.Decressin@census.gov
U.S. Census Bureau
Washington, DC 20233
(301) 763-6447

Abstract

What do firms gain by offering benefits? Economists have proposed two payoffs: (i) benefits may be a more cost-effective form of compensation than wages for employees facing high marginal tax rates, and (ii) benefits may attract a more stable, skilled workforce. Both should improve firm outcomes, but we have little evidence on this matter. This paper exploits a rich new dataset to examine how firm productivity and survival are related to benefit offering, and finds that benefit-offering firms have higher productivity and higher survival rates. Differences in firm and workforce characteristics explain some but not all of the differences in outcomes.

I. Introduction

Why do firms offer benefits to their employees? Answering this question has become increasingly important both as the costs to employers of providing such benefits soar and as the coverage of employees drops. Economists have stressed two payoffs to firms: (i) compensation in the form of benefits may be more cost-effective than in the form of wages for employees who face high marginal tax rates, and for large firms who can pool risk across employees and buy group insurance, and (ii) a compensation package that includes benefits may attract a more stable, skilled workforce. Inasmuch as both of these lead to a more productive workforce, they should lead to improved firm outcomes. However it is important for assessing the implications of policies affecting benefit provisions to understand how benefit provision affects the worker-employer matching process and whether benefits have any independent effect on firm outcomes or if they work solely by attracting high quality workers.

Disentangling the effect of benefit offerings is empirically difficult. Highly productive workers are likely to be higher paid, as well as more stable and skilled, making it econometrically challenging to separate out the effect of earnings and benefits on worker productivity and turnover. And the firm-level empirical evidence necessary to answer how and why firms differ in their benefits offerings –combined with information on workforce characteristics -- is limited. This paper uses a new dataset to examine differences in workforce characteristics and compensation between firms that offer benefits and those that do not. We are able to check whether the data are consistent with the theory that different policies attract different types of workers and we can examine the relationship between wages and benefits holding worker quality constant. We then examine firm outcomes to see the extent to which a firm's success is related to benefit offering. In doing so, we examine whether the workforce

characteristics of benefit-offering firms largely explain differences in outcomes, or whether benefits have a direct relationship to outcomes as well.

Our new dataset, which combines administrative data on benefit plans from IRS Form 5500 with integrated employer-employee data for over one million U.S. businesses and their workers, has a number of key advantages. It enables us to examine the characteristics of firms that offer benefits versus those that do not. It also permits us to examine differences in workforce characteristics, turnover, and compensation between firms that offer benefits and those that do not. Because of the firm level nature of the dataset, we can also examine the relationship between the firm's decision to offer benefits and firm outcomes such as productivity and survival. And the ample sample size enables us to examine different industries separately – since firms in different industries, with different production strategies, and different workforce needs, will choose different benefit strategies.

The paper begins by briefly describing the literature that informs our analysis. The next section describes the construction and unique characteristics of the dataset. This is followed by an investigation of the relationship between benefits provision and firm characteristics, workforce composition and turnover, and then by estimation of the relationship between benefit provision and two firm outcomes—survival and productivity. The paper concludes with a summary of our findings and a discussion of possible extensions.

II. Background

Although there is a vast literature on earnings and employment determination, there is a much smaller body of knowledge about the determinants of the provision of benefits. Yet understanding this component of compensation is important. On the firm side, in March 2004,

about 29% of compensation costs for employers in the public sector are accounted for by the cost of benefits[1] – having risen from 27.4% in March 2001. And, on the worker side, employers are the main source of health insurance for workers under 65 (Morrisey, 2002), while more than half of all workers participate in employer provided pension plans.[2] In this section we review the relevant theoretical and empirical literature.

A Why and how do Firms Utilize Benefits to Influence Workforce Composition?

There are several theoretical reasons for firms to offer benefits to their workforce. As Black (1996) points out, a very important reason is that U.S. tax policy eliminates or defers most taxes on pensions, life, and health insurance. Firms will, however, differ in their costs of providing non-wage compensation, both because of economies of scale in benefit provision or differing access to particular types of benefits plans.

Firms that offer different benefit/wage packages will end up with different workforces – although theories differ as to why this is so. In hedonic wage models, for example, workers who face a continuum of different compensation packages given by the envelope of firms' varying wage/benefit isoprofit lines, as in the standard textbook by Ehrenberg and Smith (1996, p. 247), will sort themselves into different types of firms. Variation in workers' willingness to trade off wages against benefits leads to sorting of workers into firms on the basis of fringe benefit offerings. Thus, in this model, sorting matches workers with their preferred compensation package and minimizes employers' costs of employing labor.

[1] http://www.bls.gov/news.release/pdf/ecec.pdf
[2] Employee Benefit Research Institute "Employment-Based Retirement Plan Participation and IRA Participation of Wage and Salary Workers by Income and Retirement Plan Status, 1998" http://www.ebri.org/pdfs/irainfo.pdf (July 5, 2005)

By contrast, dual labor market theory suggests there are two sectors: one with rationed 'good' jobs that pay well and have good working conditions, including fringe benefits; and a second with 'bad' jobs having low pay and few benefits (Bulow and Summers, 1986; Dickens and Lang, 1985). Efficiency wage models also generate an equilibrium in which workers with the same productive characteristics would have jobs with different levels of compensation.

Understanding which of these reasons is the correct one is important – as Miller (2004) points out in his excellent review of the literature, if the former case is correct, a mandate to employers to provide health or pension coverage to otherwise uncovered workers would result in those workers paying a large fraction of the cost through lower wages. While the notion that workers pay for their benefits through reduced wages underlies much of the literature, empirical work has often found a positive association between wages and benefits (holding constant measured worker characteristics).[3] We will compare wages at firms that offer benefits to wages at firms that do not while controlling for workforce characteristics in order to test the theory that workers trade wages for benefits.

B. How do Benefits Influence Turnover?

A long literature has documented that both pensions and health insurance are associated with lower turnover. For pensions, economists have found a negative relationship between pensions and quit rates for both defined benefit (DB) and defined contribution (DC) plans.[4] In the case of DB plans, implicit contract theory has been the primary framework used to interpret this pattern: a loss of pension wealth penalizes workers who break their implicit contract by

[3] Currie and Madrian (1999) review the literature on wage/health insurance trade offs. Ippolito (1994) summarizes the literature on compensating differentials for pensions.
[4] See, for example, the review in Gustman, Mitchell, and Steinmeier (1994).

leaving prior to retirement. This compensation structure leads to self-selection so that firms offering pensions end up with a workforce made up of stayers.

Ippolito (2002) offers an alternative explanation. One problem for implicit contract theory has been the finding that quit rates are low for firms offering DC plans as well as those offering DB plans, despite the fact that DC plans impose much smaller quitting costs (Gustman and Steinmeier, 1993, 1995; Even and Macpherson, 1996; Ippolito, 2002). Ippolito argues that quit rates are low because pensions in general attract savers, and that those who save at a higher rate also have lower quit propensities. His 2002 paper expands on earlier work (Ippolito, 1997) that argues that having a low discount rate makes both saving and staying more attractive, so pensions are one method of attracting those with low discount rates who may also have higher productivity. He presents evidence that those with characteristics that might be correlated with a low discount rate are more likely to have a pension, and are also more likely to have high performance ratings.

An alternative explanation for low quit rates under pension plans is that firms with pensions may also pay higher wages than firms without, and that the difference in wages is what accounts for lower turnover (Gustman and Steinmeier, 1995; Even and Macpherson, 2001). Gustman and Steinmeier (1995) point out that wage differences would help explain some other puzzles as well—why the reduction in turnover associated with pensions is largest for young workers, for whom the associated pension losses are small; and why the reduction appears to occur primarily through fewer layoffs rather than through fewer quits.

Thus an important question is whether benefits are associated with a workforce with more productive characteristics as well as lower turnover. In the empirical work that follows, we

address this by examining the relationship between benefit offers, wages and the skill distribution of a firm's workforce, while controlling for turnover.

C. What is the impact on firm outcomes?

If benefits play an important role in firms' compensation strategies, there ought to be measurable effects on firm outcomes such as productivity, firm growth, and survival. Such effects may come about indirectly through changes in the recruitment and retention of labor. But benefits may also affect productivity more directly by altering employees' incentives to invest in firm-specific knowledge or by reducing turnover and training costs (Even and Macpherson, 2001). There is little existing empirical evidence on the relationship between benefits offering and productivity. One exception is work by Dorsey, Cornwell, and Macpherson (1998) using Compustat data to estimate effects of DB plans on productivity using a production function framework. They find evidence of higher labor productivity in firms with DB plans, but the evidence on overall productivity effects is mixed.

Our empirical work adds to the scant evidence here by examining the relationship between benefit offers, firm survival, and labor productivity. Our dataset has a number of key advantages here. It enables us to directly examine the characteristics of a large sample of firms, including those that are not publicly traded. We also have very rich data on the distribution of employee characteristics and compensation that allow us to construct detailed controls for workforce composition. The following section describes the construction of our database.

III. Data

We combine data from several sources to construct a very rich database. It consists of business microdata on whether the business provided benefits, detailed benefit provisions, workforce composition, turnover, the distribution of worker earnings, and labor productivity. Much of this data is also longitudinal, allowing us to measure firm survival and to use detailed controls for worker quality.

A. Dataset Construction

The database combines information from five sources:

- Firm reports on benefit plans offered to employees (the Internal Revenue Service/Department of Labor Form 5500 file);
- The Census Bureau's Business Register (BR);
- Unemployment Insurance (UI) wage record data from seven states;
- The Census Numident file; and
- The Economic Census.

Benefit information comes from the Form 5500 file that contains annual reports on employee benefit plans that the sponsor (usually the employer) is responsible for filing. These filings are required under ERISA for most types of tax-preferred benefits, with some exemptions for small health plans, and are publicly available. In the results presented here we use data on plans that end in 1997, drawing from the 1996 and 1997 data files.

The Form 5500 collects information about employer-provided pensions (defined benefit and various types of defined contribution plans), 'welfare' plans (health, life, supplemental unemployment, and disability insurance plans) and 'fringe benefit' plans (cafeteria or flexible

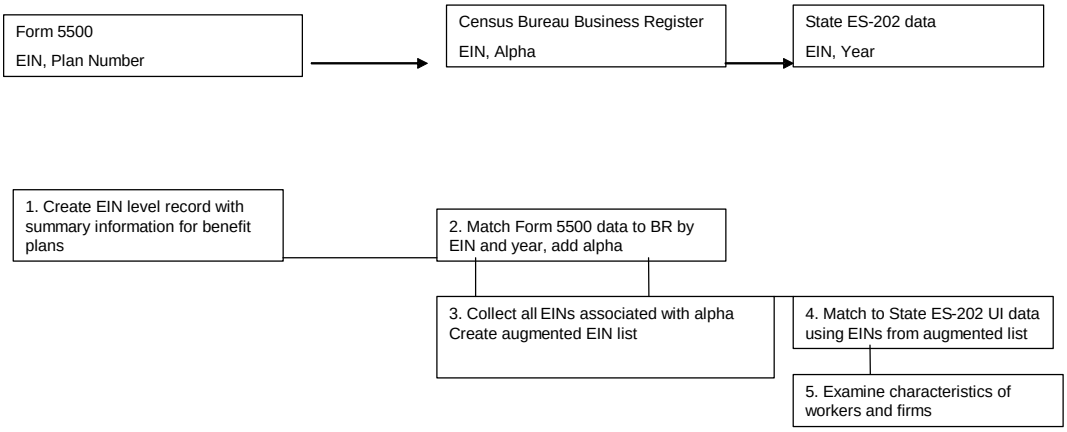
benefit plans and educational assistance plans).[5] In addition to variables describing plan features, the data also include name, address, and a federal Employer Identification Number (EIN) for the plan sponsor. EINs are also used in a wide variety of other employer tax filings, including those underlying the Census Bureau's business list.

Figure 1 describes how the dataset is constructed. The 5500 file is first integrated with Census's Business Register using sponsor EINs. The BR is a list of all private establishments with paid employment that is constructed from a variety of administrative and survey sources, but its backbone is quarterly employment tax filings that include EINs.[6] Census uses the quinquennial economic censuses and the annual Company Organization Survey in construction the BR to break out different business locations that may be filed under a single EIN. Many large firms file using more than one EIN, so these sources are also used, in combination with administrative data, to identify different EINs that may be affiliated through parent-subsidiary relationships.

[5] See appendix Table A1 for a listing of the benefit plan types and the associated frequencies among 1997 plans in the 5500 files.

[6] The BR was historically known as the Standard Statistical Establishment List or SSEL. An establishment is defined as a single physical location where business is conducted or where services or industrial operations are performed.

Figure 1: Schemata for Construction of Database



We do an initial match of the list of 5500 EINs to the BR. If a 5500 EIN matches to part of a multi-location firm, we use information on company structure from the BR to identify any other EINs (and affiliated establishments) that belong to the same company. One difficult question is whether a particular benefit is in fact offered at all establishments belonging to a company. Here, we treat all parts of a company as offering benefits if at least one EIN belonging to that company matches to the 5500 file.

Our next step is to bring in the UI data. These data are extensively described elsewhere (Burgess, Lane and Stevens, 2000), but we note several salient characteristics here. First, they include longitudinal data on both firms and workers from the mid-1990s to 2001, which permits an analysis of the dynamics of employment growth, workforce change, and firm entry and exit for this period. Second, because earnings data are available for individual workers at each of their employing firms, it is possible to analyze both earnings and employment outcomes for workers in each business. Finally, the data are almost universal in nature, capturing some 98% of employment in each state for which the data are collected. The results presented here include

data for seven states (California, Illinois, Florida, Minnesota, Maryland, North Carolina and Texas).

Although the UI wage record data are very rich in terms of sample size and coverage, they lack demographic information on workers. Limited demographic information is provided by matching the UI records with internal administrative records (the Census Numident file) that have information on date of birth, place of birth, race and sex for all workers. About 96 percent of the records in each state's UI wage data can be matched to this source.[7]

In addition, LEHD researchers (see Abowd, Lengermann, and McKinney, 2002, henceforth ALM) have estimated fixed effects for individual firms and workers based on the following wage equation:

$$(1) \qquad \ln(w_{ijt}) = x_{it}\beta + \theta_i + \psi_{j(i,t)} + \varepsilon_{ijt}$$

where j(i,t) indexes the firm j for which worker i works at time t. Ln (w_{ijt}) represents the log of full-time earnings, so the fixed effects are in terms of log earnings differences. For each worker i, this decomposition provides a measure of the fixed, portable component of their skill (θ_i), and for each firm j, it provides a measure of the fixed premium (or discount) that the firm pays after accounting for worker skills ($\psi_{j(i,t)}$).

In our empirical results we use the following as a measure of general human capital:

$$(2) \qquad h_{it} = x_{it}\beta + \theta_i$$

where x_{it} consists of race, gender, and quarters of work experience. As described in ALM, a seven-state distribution of h_{it} was created and individual workers were classified as low-skill or high-skill depending on their location in this distribution. Summary level statistics for firms

[7] See Staff of the LEHD Program (2002) for further discussion.

were created by calculating the percentage of workers at each firm that belonged to each quartile of the overall human-capital distribution.

Finally, we bring in measures of labor productivity based on data from the 1997 Economic Census (EC). We measure labor productivity as the logarithm of sales per employee deviated from the 2-digit industry mean. For multi-unit firms, we aggregate establishment-level data from the EC to the state-EIN-2 digit SIC level before matching to the 5500/UI data. For each multi-unit firm we define a primary SIC by aggregating payroll across establishments within a state that have the same 2 digit SIC code, and then taking the SIC code associated with the largest aggregated payroll.

B. Data Coverage Issues – 5500/Business Register Match

In the results that follow, we use the presence of a matching record in the 5500 file as an indicator that a firm offers benefits and then use additional information from the file to determine what sorts of benefits are offered. Whether these are reasonably accurate measures depends first on the filing requirements for the Form 5500—do all plans in fact appear in that file?—and secondly on our success in matching employers to the file if the plan they offer is in fact in it.

Filing requirements differ somewhat for pensions and other types of plans (welfare or fringe benefit plans). For pensions, only church plans and certain types of plans for small employers and the self-employed are exempt from the requirement to file.[8] Pension plans with fewer than 100 participants are generally required to file, but are required to provide less

[8] Simplified Employee Pension (SEP) plans are exempt, as are Savings Incentive Match Plans for Employees (SIMPLE) if they take the form of an IRA (but not SIMPLE 401(k) plans). Both plans can be used only by employers with at most 100 eligible employees. SEP plans do not allow for employee contributions, and employer contributions must be a fixed percentage of pay up to a maximum.

information than larger plans. Small welfare and fringe plans with fewer than 100 participants are not required to file if they are either unfunded (that is, the employer pays the costs out of general funds) and/or fully insured through an insurance provider (for example a Blue Cross/Blue Shield company). Hence small non-pension plans are only required to file if they are self-insured, and since self-insurance rates are fairly low among small health insurance plans,[9] most small health plans are probably not included in the 5500 file. Because we focus here on benefits in general, the coverage gap is more narrowly for small health plans offered by employers who do not offer pensions.

For most plans, employer and sponsor are one and the same. In these cases, Form 5500 provides the employer EIN and integration with the BR is straightforward. However, plans that involve multiple employers present more challenges. For example, Taft-Hartley plans are sponsored by trade unions—generally in occupations where employers have few employees and workers often change employer without changing occupation, such as electricians or truck drivers. Typically union labor contracts for workers covered by these plans would require an employer to pay a certain amount per hour into the plan, and workers would have some ability to maintain the same coverage while between jobs, as well as from one job to the next. These plans must file a Form 5500, but the EIN associated with such a plan belongs to the trade union rather than to any particular employer. Taft-Hartley plans are used with some frequency in construction, trucking, garment manufacturing, and grocery stores (Weinstein and Wiatrowski, 1999). While we know something about which industries are most affected, we cannot identify

[9] In 1997 among firms with fewer than 100 employees, 14.7% of establishments that offered health insurance self-insured at least one plan. (*1997 Employer-Sponsored Health Insurance Data. Private-Sector Data by Firm Size, Industry Group, Ownership, Age of Firm, and Other Characteristics.* July 2002. Agency for Healthcare Research and Quality, Rockville, MD. http://www.meps.ahrq.gov/mepsdata/ic/1997/index197.htm)

which employers are involved with our current resources. The challenge here is to develop a method to identify participating employers, a task we are still working on. However, we can identify these types of plans in the 5500 file using codes that indicate entity type for the plan sponsor.

Table 1
Form 5500 Sponsor Entity Type

Plan entity code	Frequency	Percent	Participants
Single-employer plan (A)	931,942	86.9%	117,475,092
Plan of controlled group of corporations or common control employers (B)	82,014	7.7%	114,822,479
Multiemployer plan (C)	4,787	0.5%	13,409,018
Multiple-employer-collectively bargained plan (D)	2,765	0.3%	3,355,663
Multiple-employer plan, other, (E)	6,930	0.7%	10,261,465
Group insurance arrangement (of welfare plans), (F)	24,165	2.3%	12,821,720
Missing (M or blank)	19,417	1.8%	---
Total	1,072,020	100.0%	272,145,437

Table 1 gives the distribution of entity codes for plans ending in 1997. We include summed participation numbers by entity code as well to give some idea of the importance of these coverage problems.[10] However, a single entity can have multiple plans with overlapping participation (e.g. health and pension, or both a defined benefit and a 401(k) plan), so double counting is an issue. Plans with entity codes of C and D would include Taft-Hartley plans, so we drop those plans in what follows.[11] Based on published tabulations, Taft-Hartley plans account

[10] There are 267,077 plan records that do not have participation numbers, 77% of which are 'Fringe benefit' plans for which participation is not asked.
[11] We do end up with some firms that match to plans with those codes because they match to other plans as well.

for approximately 9 percent of active pension plan enrollment for 1997.[12] 'Group insurance arrangements' present a similar problem in that these plans appear on the 5500 file, but the EIN would link to the sponsoring organization (e.g. a trade association) rather than to the employers involved.

Some employers offer more than one benefit plan, so we summarize plan level information associated with the same EIN before matching to the BR.[13] Ninety-seven percent of the 731,609 EINs in the 5500 file can be found on the 1997 BR. Limiting our analysis to records in the BR that meet our criteria for being active and in-scope gives us a match rate of 88% for the 5500 EINs.[14] The fraction of firms on the BR that match to a plan in the 5500 file is much lower. As Table 2 illustrates, only about 11% of the 5.7 million businesses in the Census Business Register have a match to a 5500 form, but the vast majority of companies that do not match to the Form 5500 data are in fact very small.[15] The low overall match rate simply reflects the predominance of firms with few employees in the overall count of firms. Of the non-matches, 54% have 5 or fewer employees, and an additional 23% have between 6 and 25 employees. Large firms (>=100 employees) account for only 0.5% of all non-matches compared to 11% of all matches. Larger firms are more likely to offer benefits and are also more likely to be required to file Form 5500 given that they offer plans. Thus it is encouraging that the

[12] See Table A2, DOL 2001. The table gives total active pension participation as about 6.6 million (but for plans with beginning year of 1997 rather than end year of 1997).
[13] Thirty percent of EINs are associated with two or more plans.
[14] The BR records that we exclude from matching either do not report any payroll for the current year or have codes that indicate that they should be outside the scope of our investigation (e.g. they are government-owned entities, which are not required to file Form 5500, or represent a trust rather than an employer). The 11% of EINs that match to these sorts of BR records might match to adjacent years of the BR, or may provide information on what sorts of plans we do not accurately match—both possibilities we plan to investigate in future work. Extensive documentation of the matching exercise is provided in Decressin et al. (2003).

majority of large firms in the Business Register can be matched to a Form 5500 filing. Because of filing exemptions and difficulties in matching, we expect coverage to be incomplete for small firms and in industries with large numbers of Taft-Hartley plans. For this reason, in some of what follows we present results for only manufacturing or wholesale (industries with little Taft-Hartley coverage) or only for firms with at least 100 employees.

Table 2
Business Register Match Rates

Number of employees	Single Unit Firms		Multi-Unit Firms		All Firms	
	Number	Match rate	Number	Match rate	Number	Match rate
Missing or 0 [16]	955,116	1.5%	2,878	15.9%	957,994	1.5%
1 – 5	2,920,703	4.6%	10,593	16.3%	2,931,296	4.6%
6 – 50	1,541,347	19.6%	106,287	42.0%	1,647,634	21.1%
51 - 100	80,890	49.3%	31,042	65.3%	111,932	53.7%
101 - 250	35,040	61.0%	26,723	74.2%	61,763	66.7%
251 - 750	8,346	65.4%	14,957	82.7%	23,303	76.5%
751 +	1,778	73.1%	9,089	90.5%	10,867	87.7%
Total	5,543,220	9.4%	201,569	53.3%	5,744,789	10.9%

If we weight these match rates by employment, firms that match to the 5500 file employ about 66% of all workers (69 million out of the 107 million in the 1997 workforce). Among multi-units the match rate is even higher: 89% of workers are employed by matching firms, compared with 35% for single-unit firms.

[15] Tables A2, A3, and A4 in the Appendix show match rates weighted by employment, match rates by industry, and match rates by firm age.
[16] Employment data on the BR come primarily from filings of IRS Form 941, which is used to report quarterly withholding of payroll and income taxes. Businesses are also asked to report employment on these forms, but the employment data are not as complete as the payroll data. We include only firms with positive payroll in the table (and the match), but some of these firms do not report any employment. This could be because the employment question asks about a particular week in the quarter and the firm had no employees on the payroll that week, or it may be that firms neglected to report employment, which is not directly tied to the tax liability.

Table 3 gives the distribution of type of plans matched among firms that match to at least one plan. A very large share of firms with some sort of matched benefit offer a pension plan, regardless of size. This probably reflects the fact that coverage of benefits by Form 5500 filings is most complete for pensions. The most notable size effect is for health plans, for which the percent offering a health plan is substantially larger for firms with greater than 100 employees. This appears to reflect in part the exemption from filing for health plans with fewer than 100 enrollees.

Table 3
Types of Plans Found for Matched Employers, by Firm Size

Number of employees	Pension	Health	Other fringe
1 – 50	87%	2%	24%
51 – 100	85%	7%	52%
101 – 250	86%	28%	55%
251 – 750	88%	57%	59%
750 +	92%	80%	72%
Total	87%	7%	30%

Comparing benefit coverage rates implied by our matched data to national survey estimates suggests that we do quite well in matching pension coverage but that we understate health coverage by even more than we would have expected. In our data, 61 percent of employees work for businesses that offer pension benefits, while 34 percent work for businesses that offer health benefits. Survey data from 1999 indicate that 48 percent of all employees participate in a retirement plan.[17] This figure excludes employees who have not met minimum length of service requirements or who have opted out of making any required employee

[17] It is difficult to put together a comparable total coverage number for pension benefits for 1997 for a couple of reasons. Prior to 1999, the BLS survey that collected data for benefits estimates (the Employee Benefit Survey) surveyed small and medium/large employers in alternating years.

contribution, and so would be expected to be somewhat below our estimate, which implicitly includes them.

In contrast, a 1997 survey estimated that 86 percent of employees work for establishments that offer health benefits—more than twice our figure.[18] We expect to understate health coverage somewhat given that certain small health plans are not required to file, but the difference seems too large for that to be the only problem. At the same time, we seem to find too much coverage under plans classified by sponsors as 'Fringe benefit' plans on the Form 5500. This should include only Section 125 cafeteria plans (flexible benefit, reimbursement, and premium conversion plans) and non-job-related education benefit plans (under Section 127 of the tax code). We find that 36 percent of employees work for firms offering plans classified in this way, while 1999 survey estimates imply that 28 percent of employees have access to Section 125 plans and only 10 percent have access to non-work related educational assistance (and presumably there is considerable overlap in those types of benefits). Because we think that some health insurance plans may appear in the 5500 files as 'Fringe benefit' plans, we focus our estimates on the more general question of whether an employer offers some form of fringe benefits, rather than a particular type of benefit plan.

C. Sample Characteristics

While we match the 5500 data to Census's Business Register as a whole, most of our empirical work is based on the subset of those data for which we also have LEHD data. Before proceeding with our results, we briefly describe the differences in samples. One difference

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Also, estimates are published separately for full-time and part-time employees. The 1999 figures cited for pensions and other fringe benefits are from www.bls.gov/ncs/ebs/sp/ebnr0006.pdf.

[18] See www.meps.ahrq.gov/MEPSDATA/ic/1997/Tables_I/TIB2.pdf.

between the overall 5500/BR sample and that used for our results is simply that we have data for seven states rather than 51. Thus we have data for parts of firms that operate across multiple states, and no data for firms that operate only in other states. As explained in ALM, human-capital summary statistics are only created for firms with at least 5 employees, due to the difficulty of applying kernel density estimation techniques for calculating distributions to firms of very small sizes. Our regressions all make use of these wage decompositions, so we further restrict our sample to firms having at least 5 employees. In addition, we do some of our productivity analyses on the subset of firms that also appear in the Annual Sample of Manufacturing (ASM) from which we derive measures of capital intensity.

Table 4 gives sample statistics for each of these samples. Clearly the most dramatic difference across samples is in the fraction of small firms. There is also a concomitant increase in the fraction offering benefits and in the firm component of wages.

Table 4
Characteristics of Alternative Samples

		Data required	
Sample characteristics	5500/BR	5500/BR and HC estimates	5500/BR/HC and ASM
Sample size	5,744,789	396,582	10,536
Firm size: <5 employees	62.5%	---	---
5-99 employees	35.8%	92.1%	58.4%
100-999 employees	1.6%	7.3%	37.2%
1000+ employees	0.1%	0.6%	4.4%
Offer benefits	10.9%	34.5%	66.4%
Relative labor productivity	---	.037	.323
Mean firm effect ψ	---	-.109	.081
Churning rate	---	32.2%	21.9

The last row gives mean churning rates, which measure the rate of accessions and separations that occur at a firm over one quarter, above and beyond those needed to allow for the firm's net growth or shrinkage over that period.[19]

IV. Results

Recall that our goal in this paper is to better understand the relationship between a firm's decision to offer benefits and firm outcomes, and to investigate whether that relationship occurs mostly through benefits' effects on workforce composition. In doing so, we assume that a match to the 5500 file is a reasonably accurate indicator that a firm offers employees benefits.[20] We begin by briefly comparing the characteristics of firms that offer benefits with those that do not. That is followed by an examination of the relationship between wages and benefits and workforce characteristics, and finally our direct results on benefits and firm outcomes.

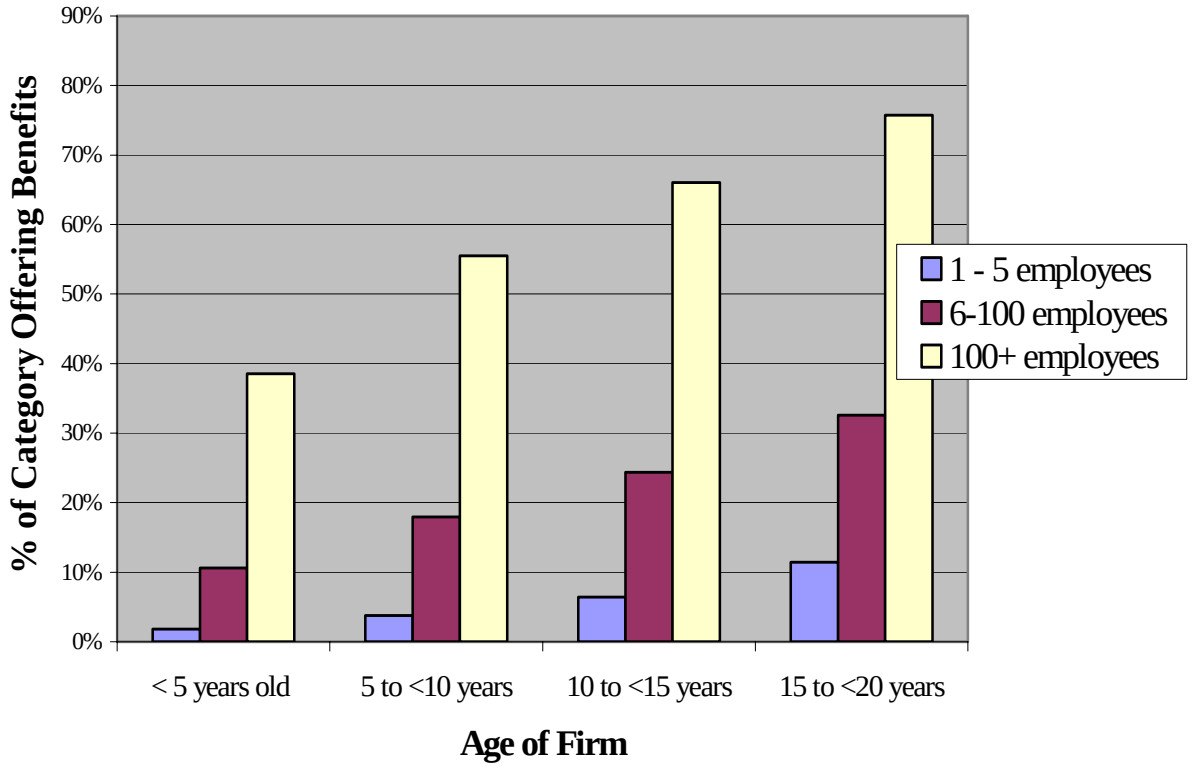
A. What Kind of Firms Offer Benefits?

Our comparisons of matched and non-matched data from the combined 5500/BR file basically confirm results found in the previous literature: a) Larger firms (both those with more employees and those with more establishments) are more likely to offer benefits (as shown

[19] The formula used is (|A+S| - |E-B|) / ((B+E)/2), where A=accessions, S=separations, B=employment at the beginning of the quarter, and E=employment at the end of the quarter.
[20] We know that this benefits measure includes some measurement error, and have documented in section III that the primary error is to misidentify some small firms that do not offer a pension plan as not offering any benefits when in fact they offer a health plan but are not required to file a Form 5500. Where we simply present differences in means, the misclassification should bias the estimated differences towards zero. It likely biases our regression estimates as well, but the direction of the biases are less clear because the misclassifications is clearly correlated with size and likely correlated with other explanatory variables as well. We think it unlikely that this measurement error is the primary driver of our findings, and so we think they remain interesting as indicators of the relationship of interest even if the size of effects may be less clear.

earlier in Table 2). b) There is substantial inter-industry variation in rates of benefit offering, with manufacturing and wholesale trade having the highest rates, and agriculture, retail trade and construction having the lowest (see Table A3). An unsurprising but less established result is that older firms are more likely to offer benefits (see Table A4). Firm age and size are correlated, but Figure 2 illustrates that the age effect is not simply a function of firm size: within firm size categories, older firms are still more likely to offer benefits. Regression results (not reported here) confirm that firm size, industry, and age all influence the likelihood of offering benefits, though the largest effects are attributed to size.

Figure 2: Benefit Coverage by Age and Size of Firm



B. What is the Relationship between Benefits and Pay?

Bringing in the LEHD State UI/ES-202 data in addition to the 5500/Business Register data allows us to examine the relationship between benefits, pay, and workforce composition in some detail, which we do in Tables 5-8.[21] As shown in the first row of Table 5 below, average earnings at benefit offering firms are almost twice those in non-benefit offering firms. Prior work has established that at least some of this is due to having a more skilled workforce. Because the ALM wage decomposition includes firm as well as individual worker effects, we have direct estimates of the component of wages paid by a firm that is due to firm-specific characteristics ($\Psi_{J(i,t)}$) after accounting for all fixed worker characteristics.

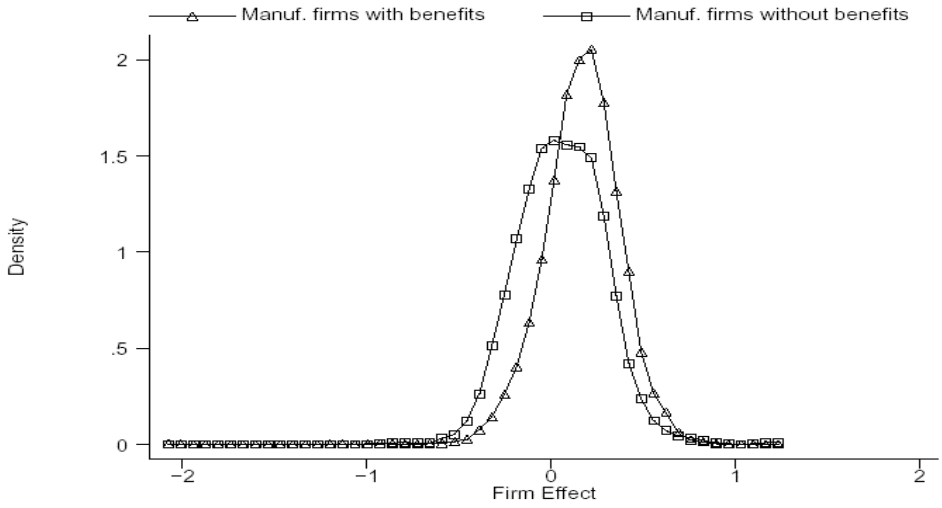
Table 5
Benefits and Pay

Averages across firms	Benefit Providing Firms	Non-Benefit-Providing Firms
Average earnings per worker	$8,719	$4,598
Firm wage effect $\Psi_{J(i,t)}$	0.063	-0.20

The second row of Table 5 shows that benefit providing firms in fact pay more on average even after accounting for the composition of their workforces. The firm fixed effect shows that the premium paid by benefit providing firms is about .06 log points, compared with -.20 points for non-benefit providing firms—a difference of about 25 percent. Figure 3 graphs the distribution of firm fixed effects by benefit status for a more homogeneous group of firms: large manufacturers. Clearly, the distribution of wage premia for benefit providing firms is substantially to the right of that for non-benefit providing firms. That is, even after accounting for fixed individual heterogeneity, firms that provide benefits also tend to pay higher wages.

[21] Appendix Table A5 gives some additional sample statistics by benefit status.

Figure 3: Distribution of Firm Effects by Benefit Offer
Manufacturing Firms with >100 Employees



C. What is the Relationship between Benefits and Workforce Characteristics?

We know from existing empirical work that benefit-providing firms have substantially different workforces than do firms that do not provide benefits. Here we first document that this is true in our data set as well, and then examine the extent to which the differences in firm characteristics documented above can explain these workforce differences. We summarize the employee human capital distribution at the firm level using the fraction of a firm's workers with estimated human capital in the bottom quartile of the distribution, and the fraction in the top quartile. That is, using the measure of general human capital introduced in equation (2), h_{it}, we calculate the fraction of workers in a firm that have h_{it} below the economy-wide 25^{th} percentile, and above the 75^{th} percentile. Table 6 presents descriptive statistics by firm benefit status.

Table 6
Workforce Characteristics by Benefit Offer

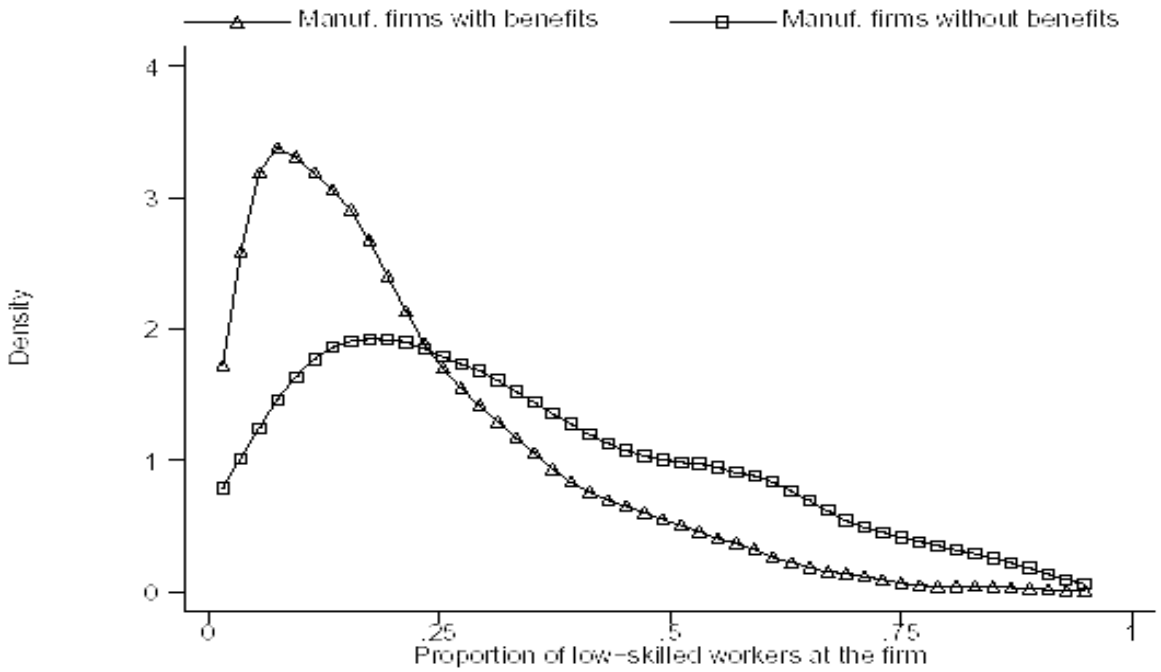
	Benefit-Providing Firms	Non-Benefit-Providing Firms
Worker characteristics		
% in top quartile of human capital distribution	31.5%	21.3%
% in bottom quartile of human capital distribution	20.8%	31.7%
% female	47.2%	48.1%
% foreign-born	13.4%	18.5%
% white	75.8%	68.7%
% prime age (25-55)	75.7%	68.5%
Churning rate	22.4%	37.3%

Notes: These measures exclude firms with <5 employees.

Clearly firms that offer benefits on average employ fewer low skill workers and more high skill workers. Interestingly, the mean fraction of workers in the middle part of the distribution (25^{th}-75^{th} percentiles) is quite similar for the two groups—48% versus 47%—though this may mask differences within that broad range. Another striking difference is that firms that offer benefits have much lower rates of labor churning. Workforce turnover, above that needed to accommodate growth or shrinkage of the firm, averages 22 percent for benefit-providing firms, compared to 37 percent for those not providing benefits.

Figure 4 gives more detail on the variation in employment at the low end of the human capital distribution, looking at a narrower sample of large manufacturing firms for which we are likely to have a quite complete measure of benefits. A comparison of the two density plots makes even clearer that benefit providing firms employ relatively few workers at the low-skill end of the distribution – few have more than 25% of the workforce that is low skill.

Figure 4: Distribution of Low Skill Employment by Benefit Offer
Manufacturing Firms with >100 Employees



We know that benefit offering is correlated with a wide variety of firm characteristics, so we turn to simple firm-level regressions to examine the relationship between workforce composition and benefit offering while holding some of these other characteristics constant. We use measures of workforce composition as dependent variables, and a dummy variable that indicates whether or not a firm offers benefits as an independent variable while controlling for other firm characteristics such as size, industry, and the firm wage premium (or discount) $\Psi_{J(i,t)}$. The results for demographic characteristics are presented in Table 7, and a similar set of regressions for the human capital and churning measures appear in Table 8.

The regression results generally confirm the differences in means reported in Table 6. Firms that offer benefits have significantly more white workers and more prime-age workers, but fewer foreign-born workers. The overall differences in race and immigrant status are similar in size to the regression-adjusted mean differences. However, prime age workers work for firms that pay more in general and also work in industries that are more likely to offer benefits, so the adjusted difference is smaller than the overall difference for this measure. While there is little difference in mean percent female in Table 6, the regression results show that women are slightly more likely to work for benefit-offering firms after adjusting for other firm characteristics. Women tend to work for firms that pay lower wages to all of their workers, but given their level of pay, are more likely to offer benefits.

Table 8 confirms the mean differences in skill levels associated with benefit offering. The sample means show a 10 percent difference in employment of those in the top quartile of the human capital distribution; using regression to adjust for differences in firm characteristics results in about an 8 percent difference. Similarly, the difference in employment of workers in the bottom quartile of the skill distribution changes only slightly after adjusting for industry, size, and the firm wage effect. The overall mean difference in churning rates is partially accounted for by differences in firm pay, dropping the mean difference from about .15 to .09.

Table 7
Workforce Demographics and Benefit Offering Regressions

Independent Variables	% female	% foreign born	% white	% prime age
Offer benefits	0.0274 (.0009)	-0.0484 (.0008)	0.0657 (.0009)	0.0253 (.0006)
Firm wage effect $\Psi_{J(i,t)}$	-0.1237 (.0012)	0.0129 (.0010)	0.0261 (.0012)	0.1265 (.0008)
Multi-unit	0.0122 (.0016)	-0.0405 (.0014)	0.0217 (.0016)	-0.0281 (.0011)
Firm size 100-999	-0.0077 (.0016)	0.0484 (.0014)	-0.1233 (.0017)	-0.0042 (.0011)
Firm size 1000+	0.0205 (.0051)	0.0518 (.0043)	-0.1454 (.0052)	0.0022 (.0034)
Mining	-0.2076 (.0061)	-0.0733 (.0051)	0.1285 (.0061)	0.1049 (.0040)
Construction	-0.2721 (.0021)	-0.0324 (.0017)	0.0345 (.0021)	0.1226 (.0014)
Manufacturing	-0.1180 (.0015)	0.0617 (.0013)	-0.0494 (.0015)	0.0991 (.0010)
Transportation	-0.1119 (.0020)	-0.0325 (.0017)	0.0326 (.0020)	0.1231 (.0013)
Wholesale trade	-0.1121 (.0016)	0.0149 (.0013)	0.0065 (.0016)	0.1078 (.0010)
Finance, insurance, and real estate	0.1642 (.0017)	-0.0495 (.0015)	0.0605 (.0018)	0.0995 (.0012)
Services	0.1541 (.0011)	-0.0369 (.0010)	0.0287 (.0011)	0.1042 (.0007)
Intercept	0.4202 (.0013)	0.1593 (.0011)	0.6588 (.0013)	0.6411 (.0008)

Notes: Based on 396,582 firms. Omitted categories: Firm size = 5-99 employees, retail trade. Controls for state included but not reported. Std errors are in parenthesis.

Table 8
Workforce Skill and Churning Regressions

Independent Variables	% high skill	% low skill	Churning Rate
Offer benefits	0.0850	-0.0798	-0.0943
	(.0006)	(.0006)	(.0027)
Firm wage effect $\Psi_{J(i,t)}$	0.0215	-0.0426	-0.1980
	(.0008)	(.0008)	(.0034)
Multi-unit	-0.0136	0.0098	-0.0239
	(.0011)	(.0011)	(.0048)
Firm size 100-999	-0.0635	0.0249	0.1786
	(.0011)	(.0011)	(.0049)
Firm size 1000+	-0.0533	0.0116	0.1728
	(.0035)	(.0035)	(.0152)
Mining	0.0722	-0.1219	-0.0875
	(.0041)	(.0042)	(.0181)
Construction	0.1071	-0.1327	0.0576
	(.0014)	(.0014)	(.0061)
Manufacturing	0.0418	-0.0722	-0.1370
	(.0010)	(.0010)	(.0044)
Transportation	0.0416	-0.1020	-0.0758
	(.0013)	(.0014)	(.0059)
Wholesale trade	0.0998	-0.1079	-0.1482
	(.0011)	(.0011)	(.0047)
Finance, insurance and real estate	0.0818	-0.0888	-0.1492
	(.0012)	(.0012)	(.0052)
Services	0.0506	-0.0498	-0.0479
	(.0007)	(.0007)	(.0032)
Intercept	0.0811	0.4657	0.4190
	(.0008)	(.0009)	(.0037)

Notes: Based on 396,582 firms. Omitted categories: Firm size=5-99 employees; retail trade sector. Controls for states are included but not reported. Std errors are in parenthesis.

D. How are Benefits Related to Firm Outcomes?

What are the consequences for firms of offering benefits, given that providing benefits has substantial effects on workforce composition, quality, and turnover? We examine two firm outcomes, productivity and firm survival, to see if we find evidence that offering benefits is associated with better firm outcomes. Because benefits are clearly not costless and do not appear to be offset by reduced wages, we expect to find a positive association between benefits and productivity. Productivity differences could, in turn, result in longer firm survival but do not guarantee it.

1. Productivity

Table 9 presents our results on the relationship between productivity and benefits offers. The dependent variable is the log of labor productivity deviated from a 2-digit industry specific mean. The unit of observation is generally a firm/state record; that is, a multi-unit firm that operates in several of the states for which we have data will have more than one record. Some of the variables included are defined for the firm as a whole (whether or not benefits are offered, firm size, multi-unit status, and firm age), while the others are generally measured within state.[22] Our primary interest is in the coefficient on the benefits indicator, which is positive and

[22] The level of aggregation is important only for multi-unit firms that have diverse operations within a state. Because of the computational resources needed to estimate the wage decomposition, our decisions about how to handle aggregation issues are in part driven by the availability of estimates originally generated for other projects. The labor productivity and capital measures are calculated at a state/EIN/2-digit SIC level, and then a single 2-digit SIC record is selected (if more than one exists) by taking the record with the highest payroll. The demographic and churning variables were handled similarly, except that the original measures were calculated at a state/EIN/1-digit SIC level. The human capital and firm effect variables are calculated at the state/EIN/2 digit SIC level. For these measures we use the observation with the highest employment because payroll is not available in these files.

significant in each of our specifications.[23] Because the dependent variable is a log difference, the coefficient on this variable in column 1 indicates that the productivity of firms that offer benefits is on average .374 log points (or roughly 40%) higher than that of non-benefit-offering firms with similar characteristics.

In column 2, we add controls for the firm's distribution of worker human capital. The first human capital variable gives the percent of the workforce with a worker fixed-effect in the bottom quartile of the distribution; the second gives the percent in the top quartile.[24] Both of these variables have large, significant coefficients of the expected sign—productivity rises with the fraction of workers in the more skilled parts of the distribution. Including these controls reduces the benefits coefficient by about .07 log points, indicating that about a fifth of the association between pay and benefits found in the first column is explained by this fairly simple characterization of worker human capital. Note that we also include controls for average worker demographics in each specification. The coefficients on gender, race and worker age are all of the expected sign except in a few cases in which the coefficients are insignificant.[25] The coefficient on the percent foreign born is somewhat surprisingly large and positive in the overall sample, but large and negative in manufacturing.

[23] We recognize that there is substantial endogeneity in several of the right hand variables we use. The results are to be interpreted simply as establishing correlations rather than causality.
[24] Note that in this specification, the omitted category is essentially the middle two quartiles of the distribution.
[25] In all columns we control for differences in productivity associated with industry, firm size, firm age and state but do not report the coefficients. The firm size indicators that we include (100<=employment<=999, and employment>=1000, with omitted category 5-99) have insignificant coefficients in the overall specification, but are positive, significant, and increasing with size in the manufacturing subsample. Firms that are more than 5 years old have about 5 percent higher productivity in the overall sample, and about 10-15 percent higher productivity in manufacturing, but there differences between age groups among those older than 5 are generally not significant.

Table 9
Productivity Differentials Associated with Benefit Offering

Independent variables	(1)	(2)	(3)	(4)	(5)
Offers benefits	0.374	0.305	0.185	0.150	0.143
	(.003)	(.003)	(.003)	(.016)	(.016)
Firm effect (**ψ**)			0.826	0.997	0.806
			(.003)	(.032)	(.031)
Percent of workers in lowest quartile of		-0.531	-0.615	-0.751	-0.583
HC distribution		(0.008)	(.008)	(.058)	(.056)
Percent of workers in highest quartile of		0.833	0.933	0.527	0.406
HC distribution		(0.008)	(.008)	(.052)	(.050)
Churning measure			-0.049	-0.041	-0.060
			(.001)	(.017)	(.017)
Percent prime age	0.784	0.576	0.238	0.378	0.311
	(.007)	(.007)	(.007)	(.062)	(.059)
Percent female	-0.364	-0.154	0.041	-0.147	-0.054
	(.006)	(.006)	(.005)	(.043)	(.041)
Percent foreign born	0.328	0.291	0.226	-0.273	-0.224
	(.007)	(.007)	(.007)	(.045)	(.043)
Percent white	0.392	0.201	0.133	-0.042	-0.052
	(.006)	(0.006)	(.006)	(.043)	(.042)
Log(capital intensity)					0.191
					(.006)
Sample	All	All	All	ASM	ASM
N	396,582	396,582	396,582	10,536	10,382
R-squared	0.144	0.199	0.308	0.309	0.379

Notes: The dependent variable in all columns is the log of labor productivity minus the average log productivity for a firm's 2-digit SIC industry. All columns also include two-digit SIC industry dummies, controls for firm size, firm age, multi-unit status, and state.

In the third column, we add the firm effect and a measure of workforce churning as additional controls. Across specifications, the churning measure has a small negative coefficient that is usually significant, but whether or not it is included has little effect on the benefits coefficient. Adding the firm effect, however, reduces the benefits coefficient substantially. While firms that offer benefits have higher productivity, they also have compensation policies that pay what appear to be equivalent workers more than they receive in other jobs, and this

component of pay has a very strong positive relationship to productivity, even when controlling for workforce composition.[26]

The fourth and fifth columns present results for the subset of our overall sample that is included in the 1997 Annual Survey of Manufactures. This sub sample is of interest because we can construct measures of capital that are not available outside manufacturing.[27] Column 4 includes the same controls as column 3—it is included to illustrate changes in coefficients that are simply a result of the change in sample. The benefits coefficient tends to be somewhat smaller in manufacturing, but in general the results do not look radically different. Adding our measure of capital—the log of capital per worker, based on the book value of capital divided by employment—has only a small effect on the benefits coefficient. Interestingly, it does reduce the size of the coefficients on the human capital and firm effect variables, so greater capital intensity does appear to account for some of the positive association found between worker skill and productivity.

2. Firm Survival

The second firm outcome that we examine is firm survival. Do firms that currently offer benefits have higher future survival rates, conditioning on other observable characteristics? Addressing this requires exploiting the longitudinal data we have on firms for 1997 to 2001. A

[26] The order in which we introduce the human capital and firm effect controls has little impact on the portion of the reduction in the benefits coefficient that we attribute to the different controls.
[27] We can construct capital measures for a larger sample of manufacturing firms by also including those that are in the 1997 Economic Census of Manufacturing (CM) but not in the ASM. This adds a lot of smaller firms, as small establishments are sampled for the ASM while large establishments are included with certainty. The ASM sample is asked more detailed capital questions, and imputation is used for some components of capital in the sample added by including non-ASM cases. We have run the same sets of regressions for both manufacturing

firm is measured as having failed if it stops filing the UI records that underlie our human capital estimates. We use a Cox proportional hazard model to estimate the probability of a firm failing in the years after 1997, conditional on surviving until 1997, and include a dummy variable for having offered benefits in 1997 to examine this relationship.[28] In addition to benefits, we also include controls for firm age as of 1997, industry, multi-unit status, firm size, and the fraction of the workforce in the bottom and top quartile of the human capital distribution.

We present estimates for two different samples in Table 10. In the first three columns, we estimate the model for all businesses, while in the last three we restrict our sample to firms with at least 100 employees. Recall that for some types of benefits (primarily health plans) sponsors are not required to file a Form 5500 if the plan has fewer than 100 enrollees, and thus we measure benefits coverage less accurately for smaller firms, which are excluded in these columns.

The second and third specifications for each sample differ from the first in that we add first the firm effect (ψ) and then labor productivity to the initial specification. In all specifications, we find a significant negative relationship between the provision of benefits and the likelihood of post-1997 firm failure. Unsurprisingly, firm age also has a large and consistently negative association with the likelihood of failure. Once age is controlled for, we actually find a slightly positive effect of firm size on failure, though it becomes insignificant when we drop small firms from our sample.

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samples, and while the coefficients are somewhat different, the general conclusions we draw are not.

[28] The Cox proportional hazard method controls for left truncation/delayed entry (firms being observed in 1997, but that were already in business before) by adjusting the log-likelihood function. Only the period of observation, 1997 and onward, is used in calculating the log-likelihood function.

Table 10
Hazard Estimates of the Relationship between Firm Death and Benefit Offering

	Sample restrictions					
	All Firms			Firms with 100+ Employees		
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Benefit	-0.248**	-0.237**	-0.201**	-0.201**	-0.224**	-0.204**
	(.010)	(.010)	(.010)	(.040)	(.041)	(.041)
100-999 Employees	0.090**	0.088**	0.065**			
	(.018)	(.018)	(.018)			
1000+ Employees	0.180**	0.178**	0.162*	0.032	0.032	0.033
	(.067)	(.067)	(.068)	(.070)	(.070)	(.070)
Multi-unit firm	-0.062**	-0.062**	-0.059**	-0.014	-0.011	0.003
	(.017)	(.017)	(.017)	(.036)	(.036)	(.036)
Firm age 5-<10	-0.423**	-0.424**	-0.422**	-0.302**	-0.298**	-0.291**
	(.016)	(.016)	(.016)	(.073)	(.073)	(.073)
Firm age 10-<15	-0.769**	-0.770**	-0.772**	-0.320**	-0.312**	-0.307**
	(.023)	(.023)	(.023)	(.083)	(.083)	(.083)
Firm age 15-<20	-1.164**	-1.164**	-1.174**	-0.749**	-0.741**	-0.733**
	(.026)	(.026)	(.027)	(.082)	(.082)	(.083)
Firm age 20+	-1.467**	-1.468**	-1.479**	-0.956**	-0.946**	-0.939**
	(.025)	(.025)	(.025)	(.072)	(.072)	(.072)
% in lowest HC quartile	0.217**	0.210**	0.084**	0.098	0.338*	0.191
	(.025)	(.025)	(.025)	(.142)	(.152)	(.154)
% in highest HC quartile	-0.693**	-0.693**	-0.513**	0.172	0.131	0.239
	(.030)	(.030)	(.031)	(.164)	(.164)	(.164)
Firm effect		-0.064**	0.102**		0.290**	0.484**
		(.011)	(.012)		(.075)	(.082)
Labor productivity			-0.240**			-0.177**
			(.008)			(.026)
Number of obs (EIN-years)	377,469	377,469	377,469	23,955	23,955	23,955
Number of failures	66,838	66,838	66,838	3,937	3,937	3,937

Notes: Omitted categories are the smallest firm category (1-4 Employees for columns 1-3, 100-999 employees for columns 4-6) and the youngest firms (0-<5 years old in 1997). Regressions also include state and one digit SIC dummies. Std errors are in parenthesis. **P-value<.01; *P-value<.05

The human capital measures do not have such consistent effects. In the overall sample, firms with more skilled workers generally have higher survival rates, though adding productivity as a control reduces the size somewhat. However, in the sample with only larger firms, the effects are generally not significant.

The firm effect, which captures firm pay differentials, is of particular interest. It has a significant negative coefficient in the overall sample when productivity is not included, but has a strong positive effect for all other specifications in which it is included. Interestingly, the difference in the sign of that coefficient between columns 2 and 5 suggests that it is only among small firms that those with higher average pay are more likely to survive. For both samples, controlling for labor productivity results in a large positive coefficient on the firm effect: holding productivity and workforce characteristics constant, higher average pay is associated with higher rates of failure. Reassuringly, labor productivity has a strong negative effect on the probability of failure.

E. Summary of Results

These results are, by and large, consistent with the literature in the findings that firms that offer benefits are larger, older, and more likely to be in particularly types of industries than firms that do not offer benefits. In addition, firms that offer benefits are more likely to have white, male, older, and more stable workers – again consistent with the literature.

A major contribution of this section, however, is the finding that firms that offer higher wages are also more likely to offer benefits – even controlling for workforce characteristics and firm characteristics. In addition, firms that offer benefits are more likely to survive than firms that do not – even after controlling for workforce and firm characteristics.

V. Summary

We began by describing our match between the Form 5500 data and the Census Bureau's Business Register. Both our knowledge of the filing requirements for the Form 5500 and our match statistics suggest that there are some problems with coverage of health insurance plans, but that coverage of pension plans is good. Given that we have reasonable coverage from the 5500/BR matched data, we then bring in detailed measures of workforce composition based on a further link to integrated employer-employee data coming primarily from unemployment insurance records. We use this combined database to address three questions:

1. What are the differences between firms that provide benefits and firms that don't, in both firm characteristics and compensation policies?
2. What is the relationship between workforce characteristics and benefits, holding constant firm characteristics and the firm's wage premium?
3. What is the relationship between the provision of benefits, labor productivity, and subsequent firm survival?

Our first set of results confirmed findings from earlier work – firms that provide benefits tend to be larger, older, and are more likely to be in manufacturing and wholesale trade. However, we also found that firms that offered benefits paid their employees more than those same employees would earn with the average non-benefit-offering firm—so workers appeared to earn both higher wages and better benefits than did observationally equivalent workers who worked for non-benefit offering firms. This is consistent with dual labor market or efficiency wage models. However if firms that pay workers more do so because some firm-specific factor makes them more productive in that match, one would expect that to show up in both wage and benefits compensation, which could also explain this finding and is consistent with the positive relationship we find between firm pay and productivity. We used new measures to confirm other

evidence that firms that offer benefits are better able to attract higher skilled, prime-age workers and have lower turnover (after controlling for size and industry).

In our analysis of productivity differences across firms, we do find that both benefits and the firm-specific component of pay are positively related to productivity. In looking at firm outcomes, we also find that firms that offer benefits are less likely to fail–even after controlling for all other observable characteristics–than are firms that do not offer benefits. Many interpretations could be put on this. One is that of endogeneity—firms that are more likely to die (either due to current financial problems, or perhaps because they are an inherently more risky business) are less likely to offer benefits. This could either be as a way to cut down on current costs, or because workers value benefits less when the risk of future default is higher.[29] Another possibility is that not enough firm-level controls were included.

[29] 87% of all firms that offer benefits offer at least one pension plan.

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Table A1
Distribution of 5500 Plan Records by Exclusive Type

Exclusive benefit plan types	Number	Percent
Defined benefit plan	64,313	6.0%
Defined contribution plan	657,324	61.3%
Other pension plan	24,916	2.3%
Health plan	65,333	6.1%
Fringe benefit plan	208,469	19.4%
Welfare and fringe benefit plan	42,851	4.0%
Welfare and pension benefit plan	2,915	0.3%
No info on plan benefit type	5,899	0.6%
Total	1,072,020	100.0%

Table A2
Business Register Match Rates, Weighted by Employment

	Single Unit Firms		Multi-Unit Firms		All Firms	
Number of employees Firm Size	Total Number of Employees in Firm Size Group	Match rate	Total Number of Employees in Firm Size Group	Match rate	Total Number of Employees in Firm Size Group	Match rate
1 – 5	6,983,813	6.1%	36,569	17.8%	7,020,382	6.1%
6 – 50	21,676,725	25.6%	2,403,573	48.9%	24,080,298	27.9%
51 - 100	5,573,566	50.4%	2,219,273	66.5%	7,792,839	55.0%
101 - 250	5,134,431	62.2%	4,190,909	75.8%	9,325,340	68.3%
251 - 750	3,227,920	66.0%	6,258,974	84.5%	9,486,894	78.2%
751 +	2,924,719	69.8%	45,038,701	95.2%	47,963,420	93.7%
Total	45,521,174	35.5%	60,147,999	89.8%	105,669,173	66.4%

Table A3
Match Rates by Industry

Major Industry of Firm	Number	Match rate
Agriculture	315,791	3.5%
Mining	20,039	12.6%
Construction	653,872	7.3%
Manufacturing	323,577	22.7%
Transportation, Communications, Electric, Gas, and Sanitary	213,180	8.6%
Wholesale Trade	396,889	18.3%
Retail Trade	1,062,810	5.0%
Finance, Insurances, Real Estate	452,873	12.0%
Services	2,179,751	13.4%
Missing SIC codes	126,007	0.4%
Total	5,744,789	10.9%

Notes: Multi-unit firms are assigned the industry that accounts for the largest share of their payroll

Table A4
Match Rates by Firm Age

Firm Age	Number	Match rate
< 5 years old	2,467,616	3.5%
5 to <10 years old	1,104,107	8.9%
10 to <15 years old	775,246	14.2%
15 to <20 years old	451,509	22.6%
>= 20 years old	816,799	27.8%
Missing	129,512	2.1%
Total	**5,**744,789	10.9%

Table A5
Firm Characteristics by Benefit Offer

	Benefit-Providing Firms	Non-Benefit-Providing Firms
Firm size		
Number of establishments	2.2	1.3
Multi-unit	12.4%	4.5%
Firm size class 2 (5-99)	83.9%	97.7%
Firm size class 3 (100-999)	14.6%	2.1%
Firm size class 4 (1000+)	1.5%	0.1%
Industry		
Agriculture	1.6%	4.4%
Mining	0.5%	0.4%
Construction	7.1%	10.9%
Manufacturing	13.6%	8.3%
Transportation	4.7%	4.1%
Wholesale trade	14.8%	7.6%
Retail trade	10.0%	25.4%
Finance	8.7%	5.1%
Services	39.0%	33.8%

Notes: Firm age is defined as the age of the oldest establishment owned by the firm. It is based on the matched BR/5500 sample. Other figures are for the sample matched to the UI data as well, which is a subset of the overall BR/5500 sample.